WRATTEN
LIGHT FILTERS

NINTH EDITION, REVISED

EASTMAN KODAK COMPANY
ROCHESTER, NEW YORK
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WRATTEN LIGHT FILTERS

INTRODUCTION

Since 1909 Wratten light filters have been recognized as occupying a unique position for photographic, technical and scientific work. This has been due partly to the wide range of filters available and to their exact adjustment for the purposes for which they are designed and partly to the great care exercised in their preparation, the standardization of the filters for color being very carefully worked out, and the standards adopted rigidly adhered to.

The filters are prepared from organic dyes, of which a great number have been investigated in our laboratory, and by means of which we have been able to prepare a long series of filters of great purity and brightness. The filters are made by coating gelatin containing a given weight of dye upon prepared glass, and after drying, stripping the film from the glass. Each filter is standardized by comparison with a permanent standard in a special instrument which applies an optical form of limit gauge to its color.

The filters are supplied in the form of gelatin film and also cemented between optical glass of two different degrees of surface accuracy, filters in "B" glass being cemented between sheets of plane-parallel glass surfaced in quantities and of sufficient accuracy for general photographic work and for most scientific work such as spectroscopy or photomicrography. This glass is, however, not of sufficiently good surface for use in photography with large aperture lenses of long focus. For such purposes we supply filters cemented in "A" glass, these being hand-surfaced optical flats of the highest quality.

Our list of filters comprises over one hundred varieties, almost the whole of which we can usually supply on demand. Besides those listed we have in stock variants from the standards, which enable us to prepare filters of any desired color. There will be found included in the list special sets of filters suitable for experimental work in orthochromatic photography, contrast photography of colored objects, color photography and color cinematography, photomicrography, spectroscopy and photometry, while filters can be selected from the list for use in investigations in physiology and psychology. We shall always be glad to offer suggestions as to filters for any special purpose and to put our knowledge and the resources of our laboratory as far as possible at the service of investigators.

Much information as to the qualities and use of filters in ordinary photographic work is given in our book "The Photography of Colored Objects." "Photomicrography" deals with the use of filters in microscopy. "Reproduction Work with Dry Plates and Films" and "Color Films, Plates and Filters for Commercial Photography" are booklets dealing with the subjects expressed by their titles. The last two booklets can be obtained free on application.

When ordering filters, the number of the filter should be given, a statement as to whether it is wanted in the form of gelatin film or cemented in "A" or in "B" glass, and the size. Where filters are listed in sets of a regular size, those sizes will generally be in stock, but it is not possible to keep in stock cemented filters of all possible sizes, and when an unusual filter or a special size is ordered, it is sometimes necessary then to cement it, which involves a delay of about two months.

EASTMAN KODAK COMPANY
ROCHESTER, N. Y.

May, 1928.

THE LIST OF FILTERS

In the list of filters, pages 16 to 19, we give the numbers and the names, many of which are arbitrary, by which we know the filters. In the second column we state the purpose for which they are generally used, and in the third column we give a list of their stabilities to light. In this, "Quite stable" means that the filter will show no change to daylight or sunlight for twelve months. "Stable" means that the filter will endure an exposure for six months. "Moderately stable" means that the filter will show some change in three months. Filters marked "Somewhat Unstable" may change in a month or less.

The list of special series of filters commencing on page 7 gives the filters most used for special purposes, and in the last two columns the approximate multiplying factors on the Wratten Panchromatic and "M" plates for the most commonly used filters. A more complete table of multiplying factors for the "M" series of filters is given in the booklet on "Photomicrography."

The absorption curves of the filters in the visible and ultraviolet regions (the dyed gelatin only) are shown on pages 23 to 60 inclusive, and the percentage transmissions on pages 63 to 75 inclusive. On pages 61-62 are found the absorption curves of twelve filters in the near infra-red region (700-950mμ). These were determined photographically on infra-red-sensitive plates. The absorption curves as determined by spectrophotometric measurements are plotted as curves of *density* against *wave length*, the *density* being the common logarithm of $\frac{1}{\text{Transparency}}$ so that a density of 1 corresponds to a transparency of 1-10th or 10%, a density of 2 to a transparency of 1%, and a density of 3 to a transparency of .1%. All *wave length* values in this booklet are expressed in terms of millimicrons (mμ) one mμ being equal to 0.000001 millimeter. Thus, if we refer to the curve of filter No. 58, we see that at the bottom of the curve, that is, at wave length 520, this filter has a density of a little less than 0.3 which is the logarithm of 2, so that at this point the filter transmits rather more than one-half the incident light. In the table, the transmission at 530 is given as 54.7%. At a wave length of 580 the filter has a density of 1 and therefore transmits 10% of the light at this point and also at the other side of its transmission curve, at a wave length of 490; similarly, the transmission drops to apprximately 1% at wave lengths 480 and 615. Thus, from these curves the transmission at any point can be seen, while the general shape of the curve gives a very good

idea of the transmission at a glance. Where the spectra extend into the ultra-violet, the absorption has been determined photographically in a quartz spectrophotometer.

Transmission in the ultra-violet beyond 330mμ will be absorbed in the case of cemented filters, as glass absorbs ultra-violet below 330mμ.

In addition to the values of transmission at various wave lengths, the value of the total transmission is also given. This item will be found at the top of each column directly under the filter number. These values of total transmission were determined visually by a flicker photometer method, the source of light used being a tungsten lamp operating at an efficiency of 1 1-4 watts per mean horizontal candle power and screened to daylight quality by means of our No. 78 photometric filter. These values were determined for our standard filter films and owing to the fact that there are certain small unavoidable variations in the filter film the values given may be somewhat in error for particular samples.

MULTIPLYING FACTORS OF FILTERS

Since a filter absorbs part of the light, its use in photography involves an increase of exposure corresponding to the proportion of effective light absorbed. The number of times by which the exposure must be increased for a given filter with a given material is called the *multiplying factor* of the filter, and this will depend both upon the photographic material and upon the light source used. A red filter, for instance, may increase the exposure thousands of times with a material having very little sensitiveness to red, while with a very red sensitive material it may increase the exposure only ten times. The same conditions apply to the use of different light sources.

It is meaningless, therefore, to refer to filters as "two times" or "four times" filters. A table of multiplying factors for the more important filters used as taking filters is given on page 76. These factors are for Eastman and Wratten Panchromatic materials when used in conjunction with different light sources. The values are only approximate, since different batches of plates vary somewhat in color sensitivity, and in order to provide for this variation a card is inserted in each box sent out, on which are given the daylight factors for a set of eight commercial filters most generally used. Comparison of the figures given on the card with those in the table will enable the factor for any other filter given in the table, but not on the card, to be estimated. On page 7 is given some additional information on multiplying factors. These values are for Wrat-

ten panchromatic plates and for Eastman orthochromatic plates and films when used with light of daylight quality. The principal use of the various filters is also given in this table.

COMMERCIAL FILTERS

Almost all subjects arising in commercial work can be dealt with by the set of eight contrast filters for commercial work. These are as follows: K1, K2, and K3, these being orthochromatic filters; and G, a deep yellow filter for contrast work; A, B, C, being the standard tricolor set; and F, a deep red filter for special work.

Name		Use	Approximate Multiplying Factors* For Panchromatic Plates and Films	For Orthochromatic Plates and Films
K1	Very light yellow	As a correcting screen where the exposure must be short.....	1½	3
K2	Light yellow	For most all-around work with "Ortho" plates.....	3	6
K3	Yellow	For correct rendering with Panchromatic plates.....	4½	12
G	Strong yellow	Where contrast is wanted with yellow objects (golden oak furniture).....	5	24
A	Orange red	For photographing mahogany with a Panchromatic plate....	12	..
B	Green	For photographing typewriting and making green white, but red dark.....	14	24
C	Deep blue	For photographing blue as white	10	8
F	Deep red	For photographing blue-prints and generally photographing red as white.....	25	..

*These factors are valid when the subject is illuminated by sunlight or white flame arc. (Approximate color temperature, 5000° K.)

The panchromatic materials referred to are the Wratten Panchromatic, Process Panchromatic, and the "M" plates, and the Eastman Commercial Panchromatic Film.

The orthochromatic materials referred to are the Eastman S. C. and Eastman D. C. Ortho plates, and Eastman Commercial Ortho films.

For those who do not care to obtain this full set the A, G, and K3 filters are recommended. At the same time, occasions may arise when other filters than these will be desirable, and where much commercial work is done a full set of commercial filters will soon pay for itself.

THREE-COLOR FILTERS

Sets of filters for three-color photography are of two kinds, —those used in taking, and those used for projection. Filters for taking need to be selected to suit the specific photographic

material and light source employed. In general, it is necessary to secure equal exposure for white or neutral gray objects through the red, green, and blue filters. This condition requires adjustment of the exposures through the three filters either by interposing suitable neutral densities or by varying the time of exposure.

The standard Wratten set of three-color filters consists of A, No. 25; B, No. 58; and C, No. 49. These are recommended for tricolor reproduction work of all kinds and, where possible, for general three-color photography.

If it is necessary to select filters that require less adjustment of the exposures than the standard Wratten set to obtain the 1:1:1 ratio on the particular material used, this may be done in the following manner. Three trial filters, a red, green, and blue, are selected by visual examination from the experimental set described below. A picture in tones of neutral gray on a white paper (an untoned bromide print is satisfactory) is photographed through each of the three filters. The three exposures must be of equal time and sufficient to give properly exposed negatives. This trial must be made on a plate or film from the same batch to be employed later for making the actual picture, and with the same light source. Also, the exposed material should receive the same development to be used later. The negatives through the three filters should be nearly identical. If they differ in density, lighter or denser filters should be selected as indicated by the first trial until as nearly a perfect match as possible is obtained. If it is not possible to match the three negatives in both the highlights and shadows it is more important that the highlights should be matched. Accurate adjustment of the exposures should then be made by one of the methods described above.

The following table may be used as a guide in making the first trial selection of filters.

	Daylight	White Flame Arc	Tungsten
Eastman Panchromatic Film	25, 58, 49B	25, 58, 49B	25, 40A, 47
Eastman Panchromatic Film (Hypersensitized)	25, 58, 49	25, 58, 49B	25, 40A, 47

Projection filters should be adjusted to give a white screen with the light source actually used. If the adjustment is not correct, the screen will appear more or less colored. For projection with a triple lantern, where ample light is available, filters Nos. 29, 61, and 46 will be found satisfactory when used with a tungsten lamp. For motion picture projection very light filters are desirable. For this purpose Nos. 24, 59, and 47 are appropriate.

For the convenience of experimenters in color work, a complete set of thirty filters, ten of each color, is supplied. The filters included in this set are as follows:

Red: Nos. 22, 23, 23A, 24, 24A, 25, 27, 27A, 28, 29;
Green: Nos. 40, 40A, 56, 57, 57A, 58, 59, 59A, 60, 61;
Blue: Nos. 45, 46, 47, 47A, 48, 48A, 49, 49A, 49B, 49C.

TWO-COLOR FILTERS

Filters for two-color photography should be adjusted in the manner described for three-color filters. Equal exposures for white objects should be obtained through the two filters.

The filters recommended for taking with a light source of daylight quality are Cine Red, No. 28, and Cine Green 2, No. 40A. Cine Red, No. 28 and Cine Green 1, No. 40 are designed for use with tungsten light source. Nos. 28 and 60 are also satisfactory for tungsten light.

For viewing filters, Nos. 25 and 44 will be found satisfactory, but for two-color projection, in order to get the best results, the special two-color projection filters Nos. 23B and 69 are recommended. For viewing anaglyphs, two special filters are made: Stereo Red, No. 26 and Stereo Green, No. 55.

For the reproduction of drawings that have been made in colors complementary to each other so that when the colors overlap a gray or black is obtained, special filters are sometimes required, and for this purpose six different pairs of filters complementary to each other are prepared. These are:

Set 1	No. 29 No. 44	Set 4	No. 21 No. 45
Set 2	No. 25 No. 58	Set 5	No. 15 No. 49
Set 3	No. 22 No. 60	Set 6	No. 8 No. 50

These will enable an engraver to cope with any such two-color originals which may arise.

WRATTEN "M" FILTERS

The "M" filters are intended for use in microscopy, and for an account of their use our booklet "Photomicrography" should be consulted. These filters are intended for use either singly or in pairs.

The "M" filters are: A, No. 25; B, 58; C, 49; D, 35, E, 22; F, 29; G, 15; H, 45; K-1, 6. By using them in pairs the spectrum can be divided into approximately monochromatic portions, and the results obtained by the use of these filters in pairs are shown in the figures on pages 59 to 60 inc.

Wratten Visual M Filters

A set of special filters intended for visual work with the microscope. Their use is described in "Photomicrography." The set consists of nine filters, Nos. 78, 38-A, 45-A, 66, 58, 15, 22, 25, 96.

Rheinberg Differential Color Filters

These filters are intended for use in the microscope condenser to produce a difference in color between an object and its background. Their use is described in "Photomicrography."

The set comprises Central Disk-Stops: (1) Greenish blue; (2) Blue; (3) Green; (4) Red; (5) Purple; (6) White matte; (7) Black; Peripheral Ring-Stops: (8) Red; (9) Orange; (10) Blue-green; (11) Blue; also (12) Red and blue sector-stop.

MERCURY MONOCHROMATS

The chief lines of the Mercury Vapor lamp occur at the following positions:

Yellow, 579 and 577
Green, 546
Blue-Violet, 436
Deep-Violet, 408 and 405
Ultra-Violet, 398 and 365

The wide separation of these lines and the great intensity of the Mercury Vapor lamp make it very suitable for use as a monochromatic light source. For the isolation of the various lines the following series of mercury monochromats has been prepared: Nos. 22, 50, and 62. The yellow monochromat (22) transmits the yellow lines only; the green monochromat, (26) about 12% of the green line and .05% of the yellow lines; the violet monochromat (50) transmits lines of wavelengths 436 and 408, and to a lesser extent 398. For visual work, for which it is intended, the line of wavelength 436 on account of its greater intensity completely overpowers the other lines.

As the green line of the Mercury Vapor lamp presents the most powerful monochromatic light source known, we have also prepared a filter, No. 77, having a sharp absorption band which removes the yellow lines. This filter transmits 72% of the green line and about ½% of the yellow lines, an amount negligible for most purposes. No. 77A, transmits 68% of the green line and completely absorbs the yellow lines. Where the red lines of the quartz lamp are objectionable and must be eliminated, filter No. 58 should be superimposed on either No. 77 or 77A.

For the isolation of the Mercury line at 365, in the ultraviolet, a new filter No. 18A is offered. This filter transmits 38% of the 365 line, and when used with a light source giving a continuous spectrum, it affords a means of obtaining ultraviolet radiation of a fairly narrow band having its maximum at 363.

WRATTEN PHOTOMETRIC FILTERS

When comparing light sources of different color upon the photometer, the color difference introduces difficulty in making an accurate balance. This difficulty can be lessened considerably if a color filter be used which equalizes the color in the two fields of the photometer by absorption, the transmission of the filter being first determined by a series of observations. The Wratten photometric filters are intended to supply a correct set of filters for use in the photometry of incandescent electric lamps including carbon, tungsten, and the nitrogen-filled tungsten lamps, the set including both yellowish filters for reducing high efficiency lamps to the color corresponding to lower efficiencies and bluish filters for the inverse purpose. These filters are designed for the reduction of color differences between lamps operating at the efficiencies indicated to such an extent that precise photometric settings can be made. They are not intended for use in determining relative efficiencies or color temperatures by the color match method. They can, however, be utilized for this purpose after special calibration. A plain dummy filter is also included in the set for use as a balance on the opposite side of the photometer head.

The filters are as follows:

No. 78	(bluish)	reducing	1.25	w/c	Tungsten	to	sensation	daylight.	Total	Transmis.	14%
No. 78A	reducing	1.25	w/c	Tungsten	to	.36	w/c	Tungsten.	"	"	39%
No. 78B	"	1.25	"	"	"	.60	"	"	"	"	54%
No. 78C	"	1.25	"	"	"	.88	"	"	"	"	74%
No. 86	(yellowish)	reducing	daylight	to	1.25	w/c	Tungsten.		"	"	60%
No. 86A	reducing	.35	w/c	Tungsten	to	1.25	w/c	Tungsten.	"	"	75%
No. 86B	"	.60	"	"	"	1.25	"	"	"	"	84%
No. 86C	"	.95	"	"	"	1.25	"	"	"	"	85%

These filters can also be applied to the reduction of carbon lamps to match tungsten.

No. 78A reduces carbon at 3 w/c to 1.25 w/c Tungsten.
No. 86A reverses this reducing the Tungsten to match the carbon.

In addition, a special filter is made for reducing 500-watt Commercial Mazda C Tungsten to sensation daylight having a total transmission of 22%. This is known as filter No. 78AA.

SPECIAL SETS OF FILTERS

Other sets of filters appropriate for scientific work are the monochromatic set of seven filters, the spectroscopic set of eight filters, and the two laboratory sets, one a complete set of 50 filters in a case and a smaller set of 24 filters in a case. For a description of the filters included in this list see pages 81 to 84 inclusive.

A MONOCHROMATIC VIEWING FILTER FOR PHOTOGRAPHERS

This filter, of a pure yellow color, transmits a narrow region of the spectrum, so narrow that although it is possible to distinguish between a red and a green when viewed through it, the difference between the colors is so dulled that they no longer materially affect judgment as to their relative luminosity.

It is, of course, impossible to construct a filter which will at the same time remove all appearance of color from a subject and strictly retain the relative luminosities; but the filter which we have produced is, we believe, the best compromise which can be obtained and will enable all workers who are in the habit of using orthochromatic methods for the reproduction of colored objects to anticipate the effect upon the plate before exposure. This knowledge will also show when it may be necessary, as it sometimes is in special cases, to modify a strictly orthochromatic reproduction by allowing play to the effects of color contrast by the use of suitable filters.

NEUTRAL TINT FILTERS AND WEDGES

Neutral tint filters and wedges are of use in many branches of optical work since they permit the reduction of light intensity in a known and definite manner without affecting its quality. Those made by the Eastman Kodak Company are of gelatin containing a mixture of dyes so balanced as to obtain substantial spectral neutrality. They are made of certain definite transmissions, which are measured with precision upon approved types of photometers.

Experience has shown that the transmission of a neutral tint filter depends to the extent of 2-3% on the optical system with which it is used, owing to slight scattering of the transmitted light and inter-reflections. Neutral tint filters are therefore supplied now only within an accuracy of $\pm 5\%$ of the stated transmission value, and it is recommended for precision work that they be calibrated by direct measurement in the conditions under which they are to be used.

The filters listed are of the transmission stated within a precision of 5%. Special calibrated filters can be furnished on order. Requests for quotations on such filters should be accompanied by complete statements of size, precision required, and conditions under which the filters are to be used.

The wedges are listed with or without calibration; calibrated wedges can only be supplied with a compensator or a balancing wedge. A compensator is a wedge of uncolored gelatin intended to balance the reflections from the glass and absorption of the glass and gelatin.

All wedges are larger than the size given, which is that of the tinted area. 2.54 cm. of clear glass is left at the thick end of all wedges, 2.00 cm. of clear glass at the thin end of large wedges, and 1 cm. at the thin end of small wedges.

Compensators and balancing wedges, if required, must be ordered at the same time as the wedge, and one of these is necessary if a calibration of the wedge is required.

Short balancing wedges can be supplied to fit any wedge, these being short wedges identical with the lightest portion of the wedge, which when superposed in the opposite direction neutralize the wedge effect and produce a field of uniform intensity.

The absorption of filters and wedges may be defined in terms of their transmission or of their density. The density is the logarithm of $\frac{1}{\text{transmission.}}$ Thus we have:

Transmission	Density
1/2	.301
1/4	.602
1/8	.903
1/10	1.0
1/100	2.0
1/1000	3.0
1/10,000	4.0

THE CARE OF FILTERS

In its simplest form (gelatin film) a filter requires a considerable amount of care in handling. If it be used in front of or behind the lens in any form of carrier it should be removed after use and placed, in clean paper, between the leaves of a book, where it will keep flat and dry. Moisture tends to cloud gelatin film filters. The fingers are invariably moist and, to a certain extent, greasy; hence, in handling gelatin films, care should be exercised to hold them by the extreme corner if the filters be square, or, better still, by the edges only.

If it be necessary to cut the film, it should be placed between two clean pieces of fairly stiff paper, note-paper for instance, and cut with a pair of sharp scissors.

Cemented filters should be treated with care equal to that accorded to lenses. They should be kept in their cases and on no account allowed to get damp or dirty. A filter should never be washed with water under any circumstances, because if water comes into contact with the gelatin at the edges of the filter it will cause it to swell and separate the glasses, causing air to run in between the gelatin and the glass. Even if the swelling does not cause air to enter in this manner, the filter will be strained and the definition spoiled.

Filters are clean when sent out by the makers, and with reasonable care they can be used indefinitely. If for any reason a filter gets so dirty that it cannot be cleaned by simple rubbing after breathing on it, a piece of fine tissue paper should be moistened with denatured alcohol and gently rubbed over the surface of the filter. Care must be taken that the tissue paper is not wet enough for the alcohol to run out and spread over the edge of the filter, as it is a solvent of the balsam with which filters are cemented and will soften it so that air may enter. Before attempting to clean a filter at all, it is well to make sure that both the surface of the glass and the material are entirely free from grit, which will scratch the glass.

Undue heat is also dangerous to filters, as it softens the balsam and causes the gelatin to contract, so that filters should always be protected from heat as far as possible.

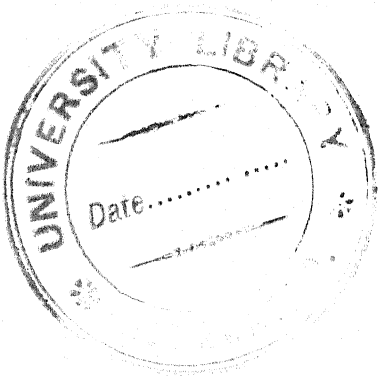
PLATE SPECTRA

On page 20 are shown wedge spectra of the plates which are available from our laboratory for use in spectroscopy and other scientific work. These spectra are photographed in a spectrograph, in which a small black wedge has been placed in front of the slit. This wedge leaves one end of the slit clear but interposes a density so great that only .0001 of the incident light is transmitted at the other end. There will, therefore, be a gradation in the intensity of light from 1 to .0001, each decimal increase being indicated by a horizontal line so that if the intensity at the base of the spectrum is unity, that at the first line represents an intensity of .1, the second line .01 and the third line .001. These spectra, therefore, show graphically the sensitiveness curve of the plate. Since we sometimes have inquiry for these small wedges, this occasion is taken to an-

nounce that we cannot supply them as they cannot be made from gelatin, of which material such neutral tint wedges as we supply are made. Wedges for this purpose are so small that they must be ground from black optical glass and they are obtainable from manufacturers of optical instruments.

For use in the extreme red and for such work as haze cutting in the photography of very distant scenes the "Extreme Red Sensitive" plates are recommended. For spectroscopic work in the near infra red the "Infra Red Sensitive" plates are prepared with the new sensitizer "Neocyanine." These plates require hypersensitizing by bathing in ammonia solution before use. Panchromatic materials are available as cut film and as motion picture film while for conditions where the greatest color sensitiveness is required hypersensitized panchromatic motion picture film is made.

Panchromatic K motion picture film is sensitized in the same way as the "Extreme Red Sensitive" plates and is used for the imitation of "night" scenes.



LIST OF FILTERS

The numbers asterisked constitute our Laboratory set of 50 filters.

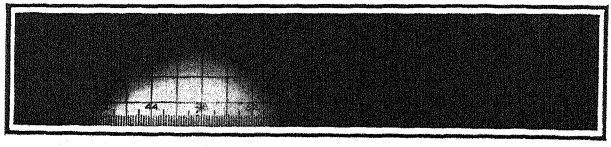
No.	Name	Use and Remarks	Stability to Light
Colorless			
0	Plain Gelatin	For Focusing	Stable
* 1	β-Naphtholdisulphonic Acid	Removes Ultra-Violet	Moderately stable
* 2	Aesculine	Removes Ultra-Violet (superior to No. 1)	Goes brown (especially when cemented.)
Yellows			
* 3	Aero No. 1	Aerial Photography	Quite stable
4	Kodak Color Filter	Orthochromatic	Quite stable
* 6	K1	Orthochromatic (Micro.)	Quite stable
* 7	K1½	Orthochromatic	Quite stable
* 8	K2	Orthochromatic	Quite stable
* 9	K3	Orthochromatic	Quite stable
*12	Minus Blue	Complementary Filter	Quite stable
*15	G	Contrast (Micro.) (Vis. Micro.)	Quite stable
*16	Flavazine T	Contrast	Quite stable
*17	Quinoline Yellow	Transmits Ultra-Violet, absorbs Violet.	Stable
*18A	Ultra-Violet	Transmits Ultra-Violet, and Infra Red only. (Cannot be supplied as film, but only cemented in optical glass). Note special price.	Stable
Oranges and Reds			
*21	Monobromofluoresceine	Contrast	Moderately stable
*22	E2	Contrast (Micro.) (Vis. Micro.) (Taking filter for two-color photographs.) (Mercury Yellow)	Moderately stable
*23	E Red	Contrast	Moderately stable
23A	E Red (light)	Experimental Tricolor Projection Filter	Moderately stable
23B	Two-Color Red	Additive Projection	Moderately stable
24	Proj. Red	Additive Tricolor Projection Filter	Moderately stable
24A	Proj. Red (light)	Projection Filter (Experimental Tricolor Filter).	Moderately stable
*25	A (Tricolor Red)	Contrast (Micro.) (Vis. Micro.) (Standard Tricolor.) (Viewing Filter for two-color photographs.)	Moderately stable

No.	Name	Use and Remarks	Stability to Light
*26	Stereo Red	Viewing Filter for Anaglyphs	Moderately stable
27	Stage Red	Experimental Tricolor Filter	Stable
27A	Stage Red (light)	Experimental Tricolor Filter	Stable
28	Cine Red	2 Color Taking Filter	Stable
*29	F	Contrast (Micro.) (Red for Additive Synthesis.) (Analysis Red for Screen-plates.)	Moderately stable (Darkens very slightly.)
Magentas and Violets			
	Transmitting both red and blue		
*30	Rose Bengal	Absorption Filter	Not stable
30A	Q	Absorption Filter	Moderately stable
31	Minus Green 1	Absorption Filter	Somewhat unstable
*32	Minus Green 3	Complementary Filter	Moderately stable
33	Xylene Red	Absorption Filter	Stable
34	D (light)	Absorption Filter	Somewhat unstable
*35	D	Contrast (Micro.)	Moderately stable
*36	Methyl Violet B.B.R.	Very deep Absorption Filter	Moderately stable
Blues and Blue Greens			
37	β-Blue	Absorption Filter	Stable to light, but very sensitive to heat.
*38	Toluidine Blue	Absorption Filter	Quite stable
38A	Dark Toluidine Blue	Absorption Filter (Vis. Micro.)	Quite stable
39.	Duplicating	Control of Contrast (Motion Picture Duplication)	Stable
40	Cine Green 1	2 Color Taking Filter (Tungsten Source)	Moderately stable
40A	Cine Green 2	2 Color Taking Filter	Moderately stable
43	Minus Red 2	Absorption Filter	Sensitive to heat
*44	Minus Red 4	Complementary Filter (Viewing Filter for two-color photographs.)	Moderately stable (Not sensitive to heat.)
*44A	Minus Red 5	Complementary Filter (Viewing Filter for two-color photographs.)	Moderately stable (Not sensitive to heat.)
*45	H	Contrast (Blue green for Microscopy)	Moderately stable (Darkens)
45A	Blue Green	Contrast (for Microscopy) (Vis. Micro.)	Moderately stable (Darkens)
46	η-Blue	Contrast (Blue for Additive Synthesis)	Moderately stable (Darkens)
*47	Projection Blue	Projection Tricolor Filter	Stable
47A	Stage Blue	Experimental Tricolor Filter	Stable
*48	C2	Absorption Filter	Stable
48A	C3	Absorption Filter	Stable
*49	C4	Contrast (icro.) StandMard Tricolor Filter	Stable

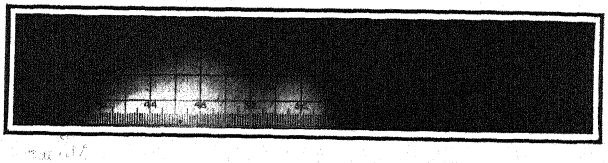
No.	Name	Use and Remarks	Stability to Light
49A	C4 (light)	Experimental Tricolor Filter	Stable
49B	C4 (dark)	Experimental Tricolor Filter	Stable
49C	C4 (extra dark)	Experimental Tricolor Filter	Stable
*50	L	Contrast (Analysis Blue for Screen-plates.) Mercury Violet.	Moderately stable
Greens			
51	Naphthol Green 1	Absorption Filter	Quite stable
52	Naphthol Green 2	Absorption Filter	Quite stable
53	Naphthol Green 3	Absorption Filter	Quite stable
54	Naphthol Green 4	Absorption Filter	Quite stable
55	Stereo Green	Viewing Filter for Anaglyphs	Stable
*56	B3	Absorption Filter	Stable
*57	B2 (light)	Absorption Filter	Stable
57A	B2 (extra light)	Experimental Tricolor Filter	Stable
*58	B2	Contrast (Micro. Standard Tricolor) (Vis. Micro)	Stable
58A	B2 (dark)		Stable
*59	Projection Green	Tricolor Filter for Additive Projection	Stable
59A	Projection Green (light)	Experimental Tricolor Filter	Stable
*60	P	Contrast (Taking Filter for two-color photographs)	Stable
*61	N	Contrast (Green for Additive Synthesis.) (Analysis Green for Screen-plates.)	Stable
*62	Mercury Green	Mercury Monochromat.	Stable
*63	ϵ-Green	Absorption Filter	Stable
64	Minus Red 3 (light)	Absorption Filter	Stable
*65	Minus Red 3	Absorption Filter	Stable
65A	Minus Red 3 (intermediate)	Absorption Filter	Stable
66	Rapid Filter Green	Absorption Filter (Vis. Micro.)	Stable
67	Filter Blue Green	Absorption Filter	Stable
68	Fast Green Blue Shade	Absorption Filter	Stable
69	Two-color Blue Green	Additive Projection	Stable
Monochromats			
*70	α-(contrast R)	Deep Red Monochromat.	Moderately stable
*71A	β	Orange Red	Moderately stable
*72	γ	Orange Yellow	Moderately stable
*73	δ	Yellow Green	Stable
*74	ϵ	Pure Green	Stable
*75	η	Blue Green	Moderately stable
*76	θ	Violet (Compound). Note special price.	Moderately stable

No.	Name	Use and Remarks	Stability to Light
*77	Special Mercury Vapor Lamp Monochromat, only supplied cemented in optical "A" glass		Quite stable
77A	Special Mercury Vapor Lamp Monochromat, only supplied cemented in optical "A" glass		Quite stable
Photometrics			
*78	Tungsten to daylight (visual)	Photometric Filter (Vis. Micro.)	Stable
78AA	Tungsten (Mazda C) to daylight	Photometric Filter	Stable
78A	Photometric Bluish	Photometric Filter	Stable
78B	Photometric Bluish	Photometric Filter	Stable
78C	Photometric Bluish	Photometric Filter	Stable
79	Acetylene to daylight	Photographic Compensator. Note special price (compound)	Moderately stable
*86	Daylight to Tungsten	Photometric Filter	Moderately stable
86A	Photometric Yellowish	Photometric Filter	Moderately stable
86B	Photometric Yellowish	Photometric Filter	Moderately stable
86C	Photometric Yellowish	Photometric Filter	Moderately stable
Miscellaneous			
87	Extra Dark Infra Red	Absorption Filter	Quite stable
*88	Infra Red as used by Prof. R. W. Wood	Absorption Filter	Quite stable
88A	Infra Red	Absorption Filter	Quite stable
89	Signalling Red (light)	Absorption Filter	Stable
89A	Signalling Red (dark)	Absorption Filter	Stable
90	Monochromatic Viewing Filter	Viewing Filter	Stable
91	Z (Infra Red) (compound)	Absorption Filter	Moderately stable
96	Neutral Filter. Supplied in all densities. See special list.	(Vis. Micro.)	Moderately stable
97	Dichroic Filter	Absorption Filter	Moderately stable
97A	Dichroic Filter (light)	Absorption Filter	Moderately stable
97B	Dichroic Filter (extra light)	Absorption Filter	Moderately stable

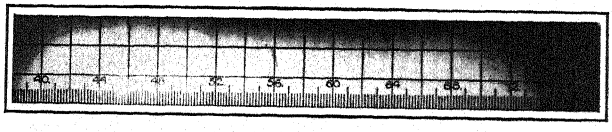
PHOTOGRAPHS OF WEDGE SPECTRA TAKEN ON STANDARD PHOTOGRAPHIC PLATES



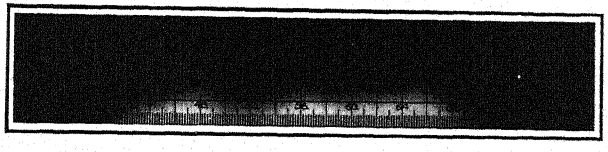
Eastman 40



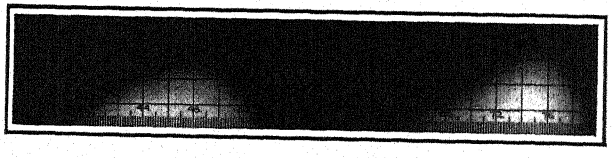
Eastman DC Ortho



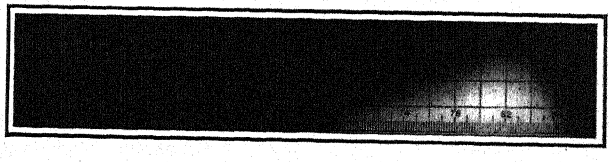
Wratten Panchromatic



Wratten M Panchromatic

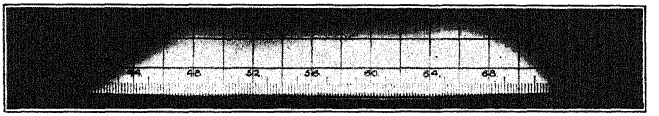


Wratten Extreme Red

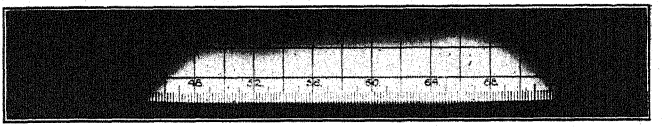


Wratten Infra Red

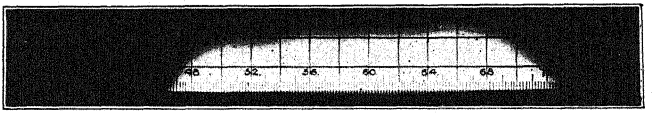
PHOTOGRAPHS OF WEDGE SPECTRA THROUGH CERTAIN FILTERS ON WRATTEN PANCHROMATIC PLATES



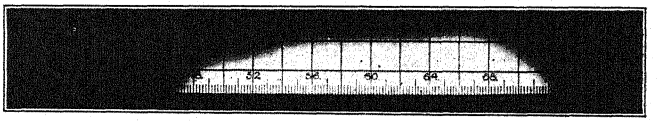
K1



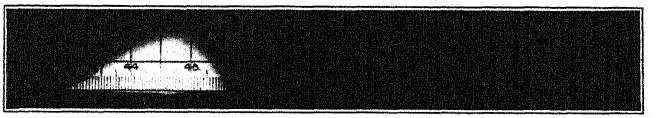
K 1½



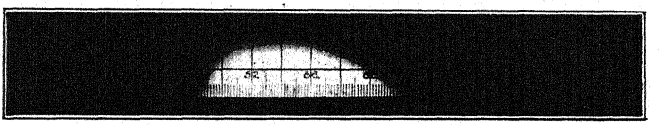
K 2



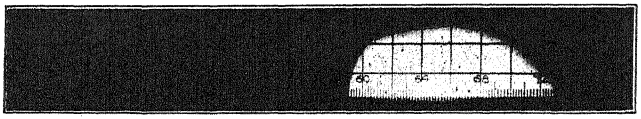
K 3



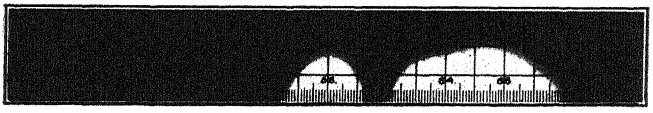
C (Tricolor Blue)



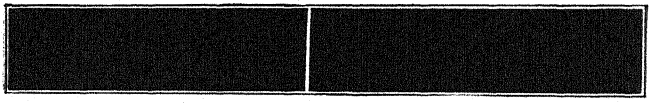
B (Tricolor Green)



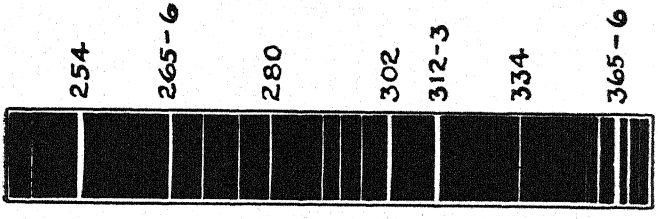
A (Tricolor Red)



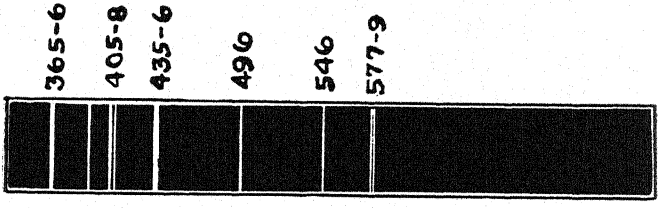
Mercury Green Line Filter No. 77



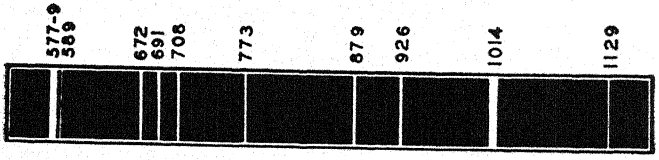
Spectrum of Mercury Vapor Lamp Transmitted by No. 77



Ultra Violet Spectum of Quartz Mercury Vapor Lamp

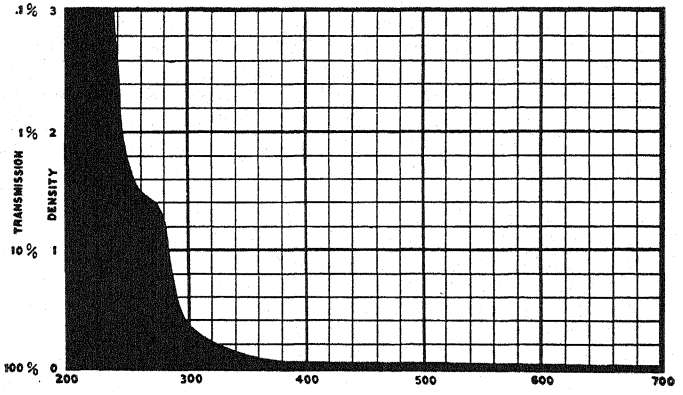


Spectrum of Mercury Vapor Lamp

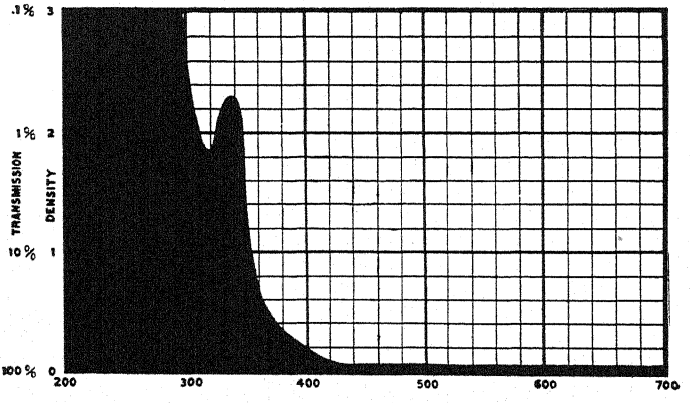


Spectrum Mercury Vapor Lamp in Infra Red

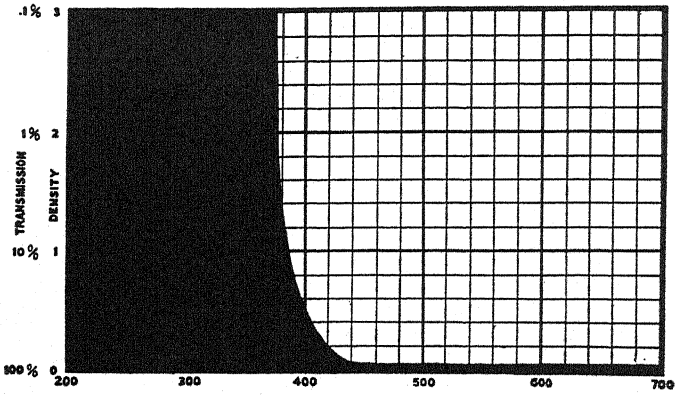
SPECTROPHOTOMETRIC ABSORPTION CURVES OF FILTERS



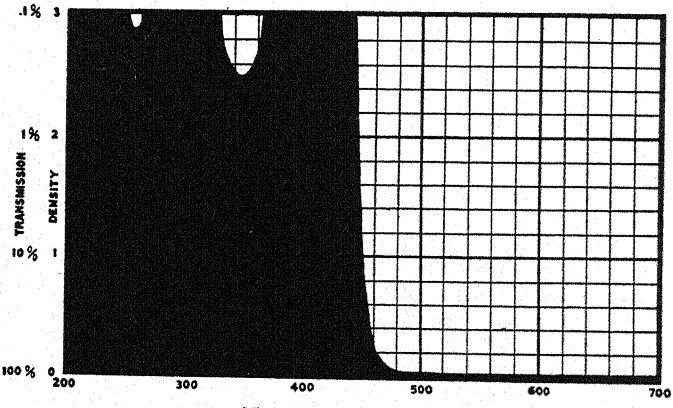
No. 0. Plain Gelatin



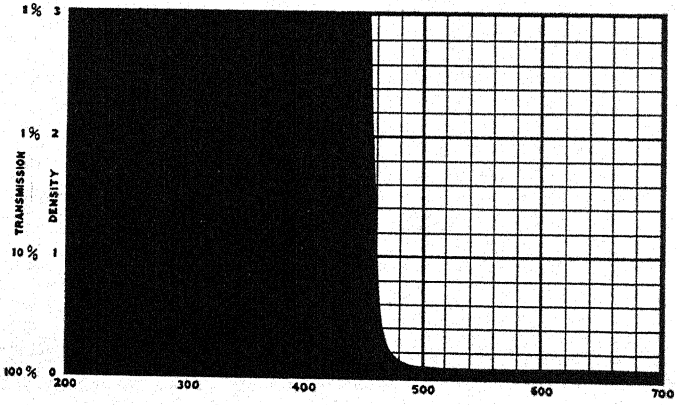
No. 1. β-Naphtholdisulphonic Acid



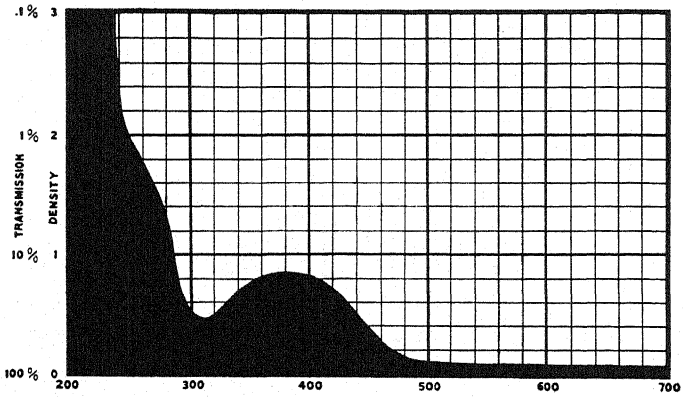
No. 2. Aesculine



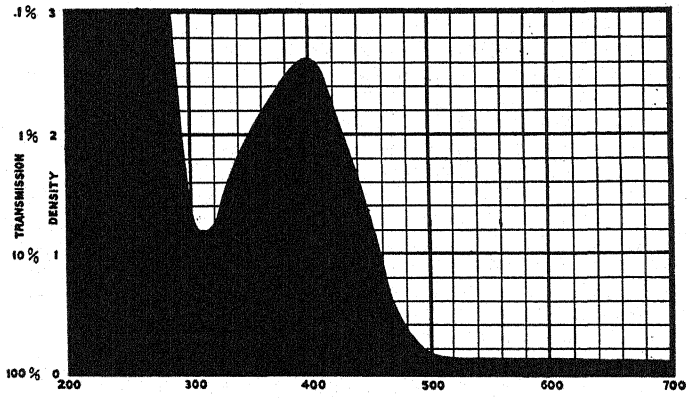
No. 3. Aero No. 1



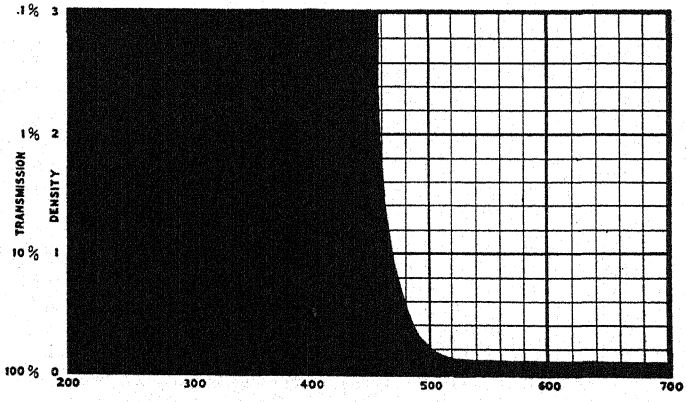
No. 4. Kodak Color Filter



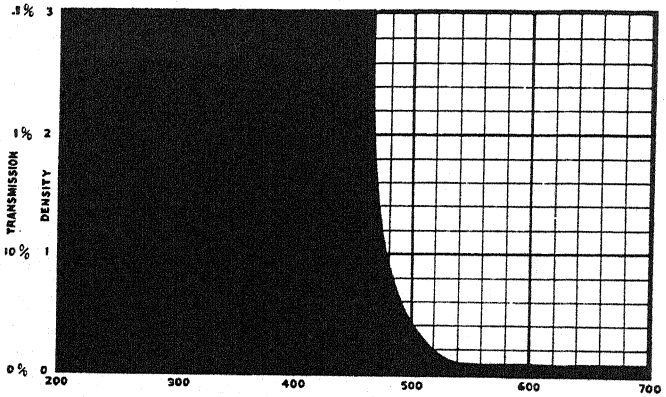
No. 6. K1



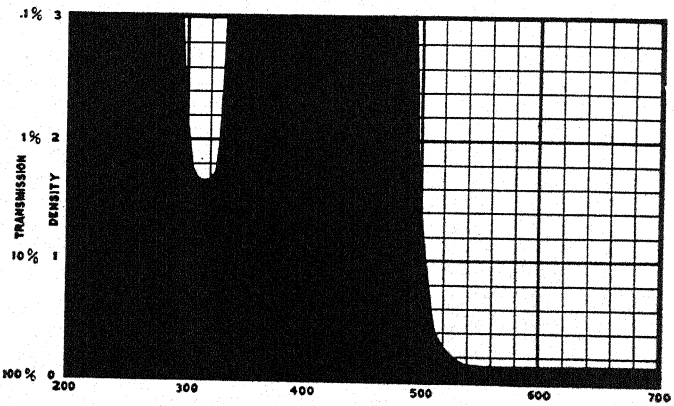
No. 7. K1½



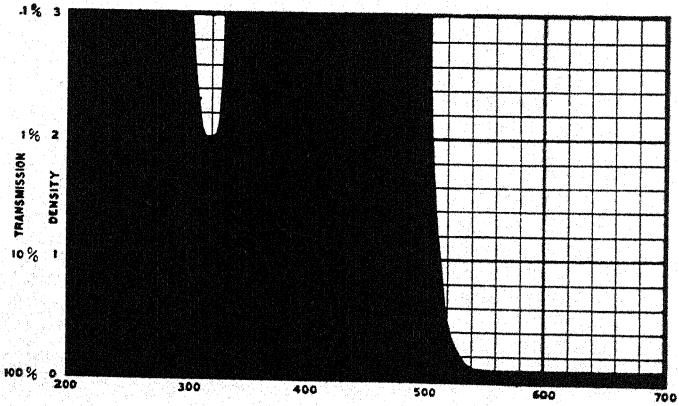
No. 8. K2



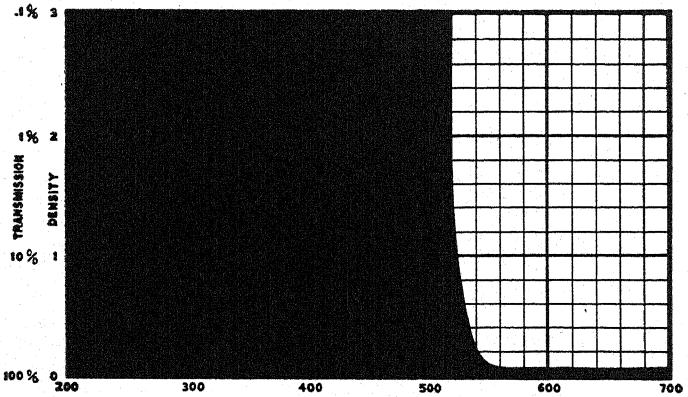
No. 9. K3



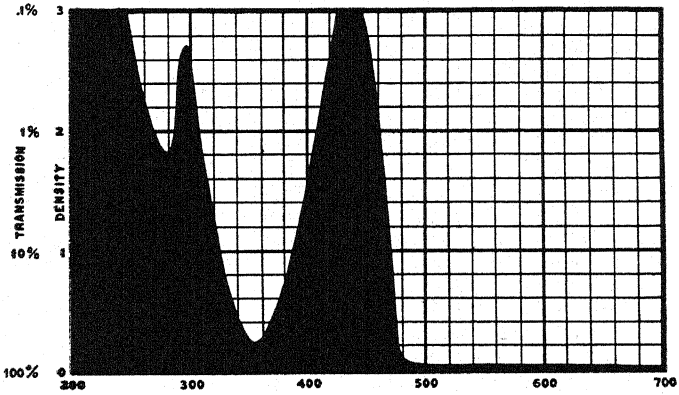
No. 12. Minus Blue



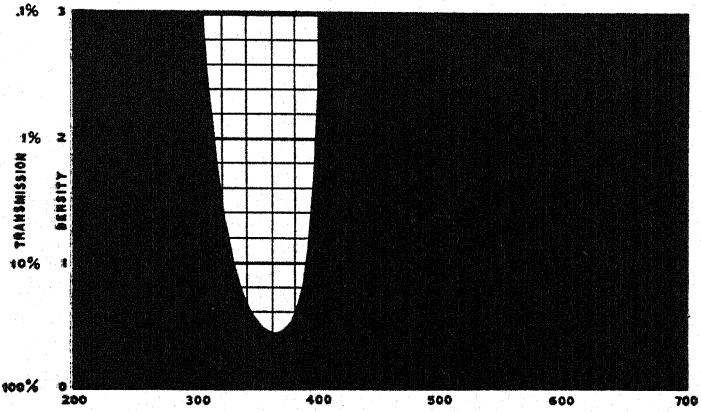
No. 15. G



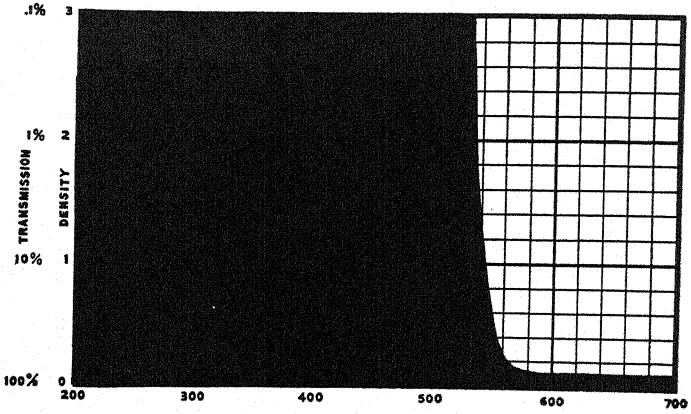
No. 16. Flavazine T



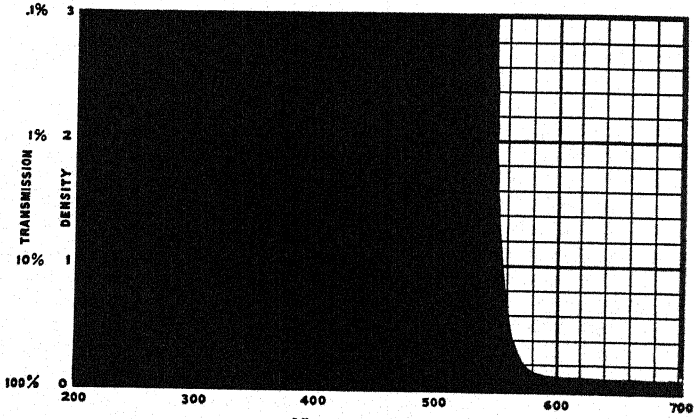
No. 17. Quinoline Yellow



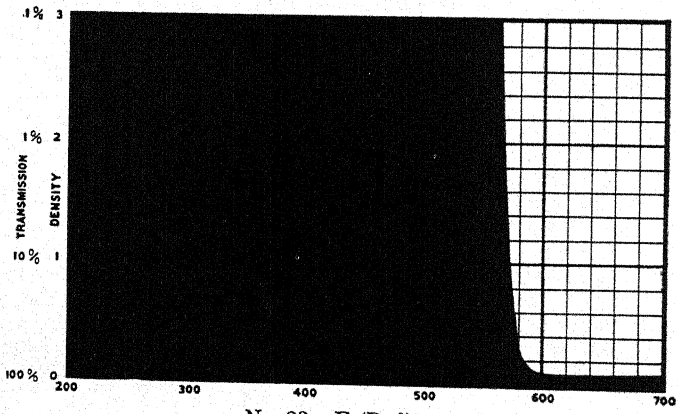
No. 18A. Ultra-Violet



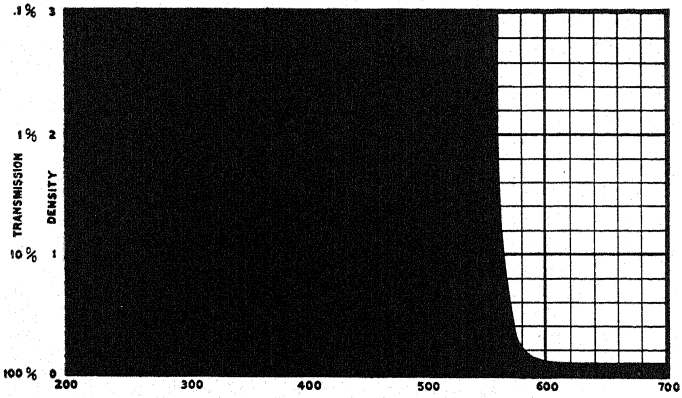
No. 21. Monobromofluoresceine



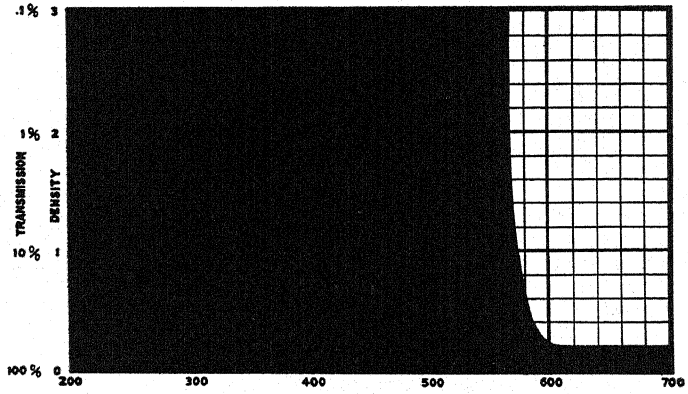
No. 22. E2



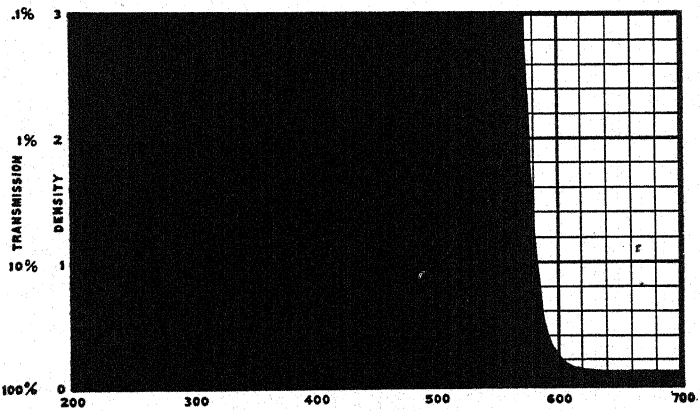
No. 23. E (Red)



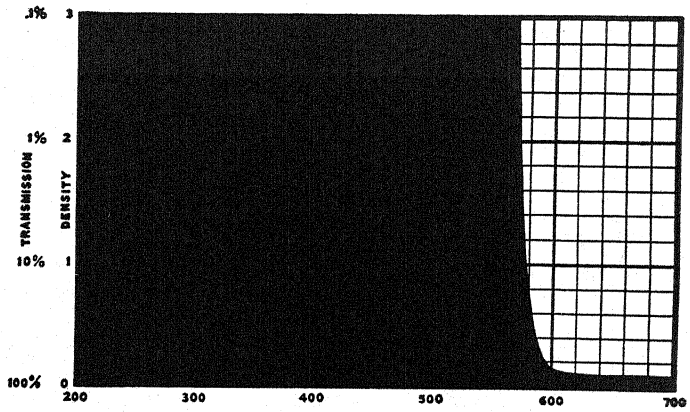
No. 23A. E Red (light)



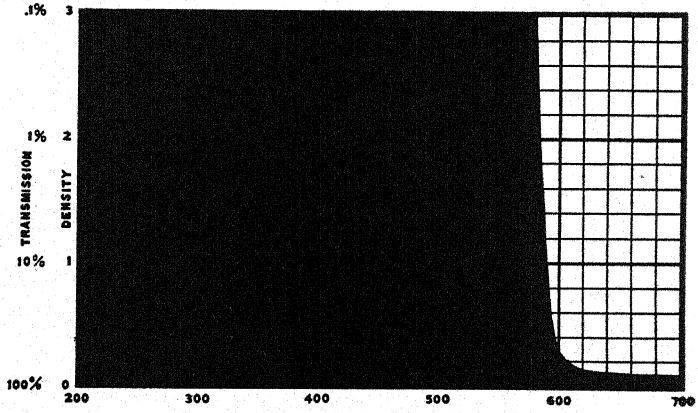
No. 23B. 2–Color Red



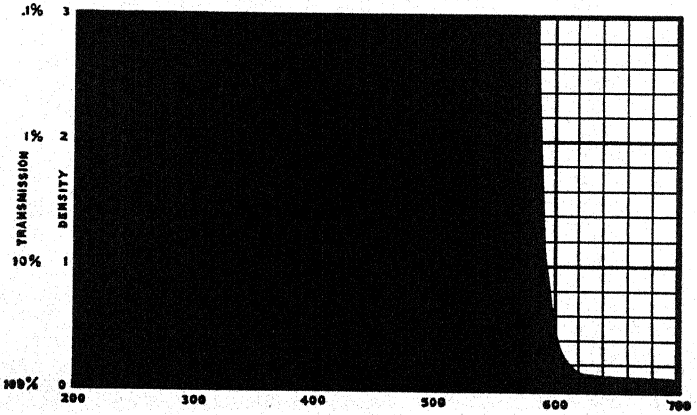
No. 24. Projection Red



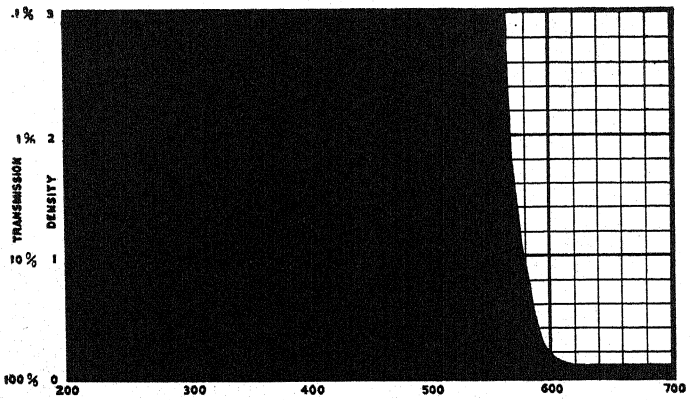
No. 24A. Projection Red (light)



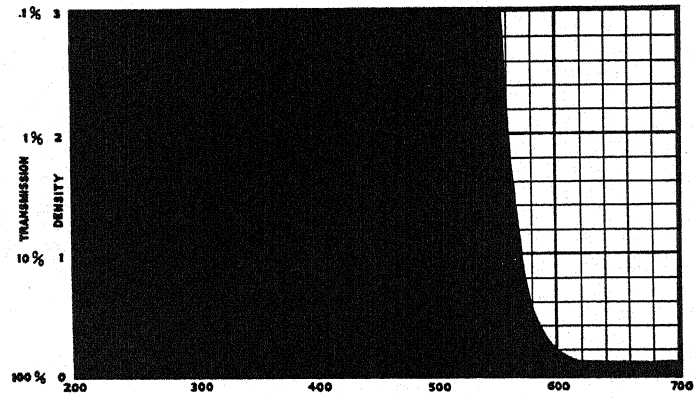
No. 25. A (Tricolor Red)



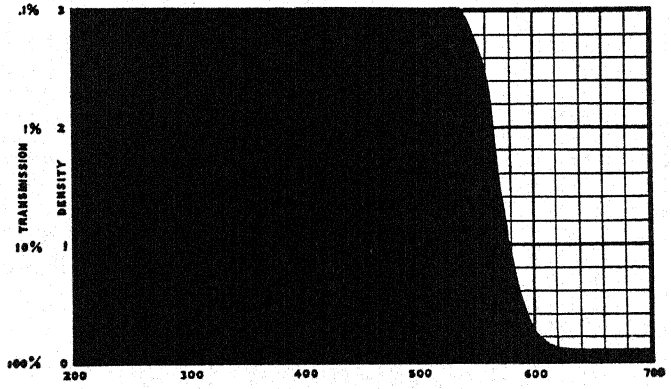
No. 26. Stereo Red



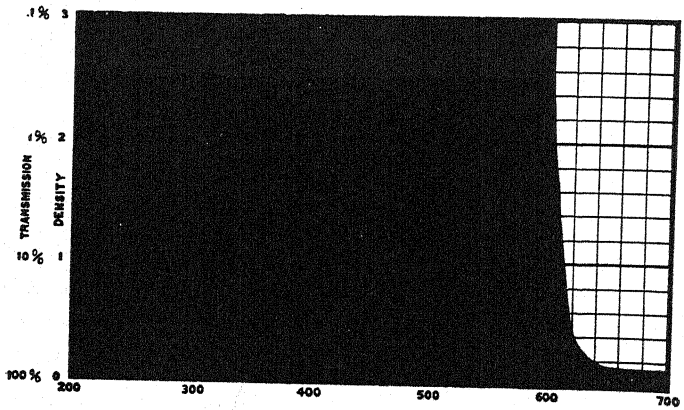
No. 27. Stage Red



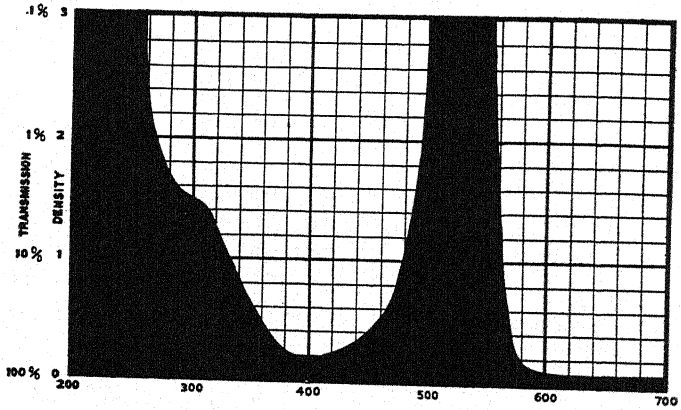
No. 27A. Stage Red (light)



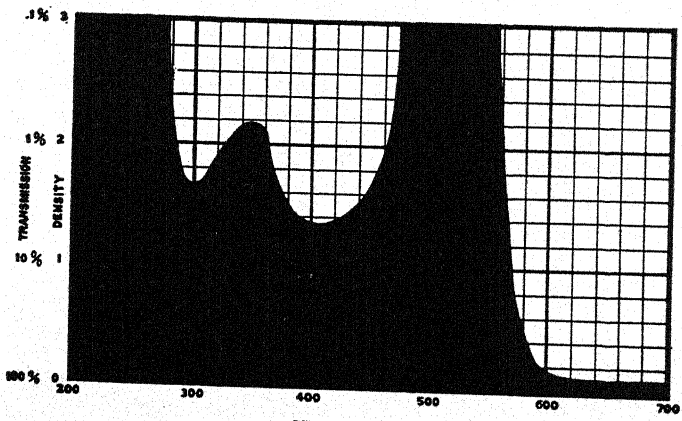
No. 28. Cine Red



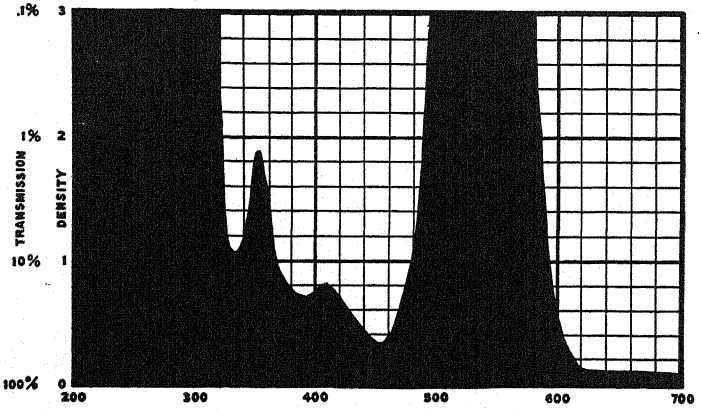
No. 29. F



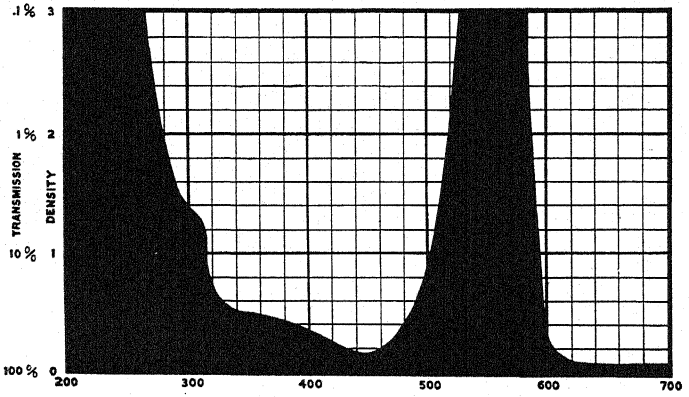
No. 30. Rose Bengal



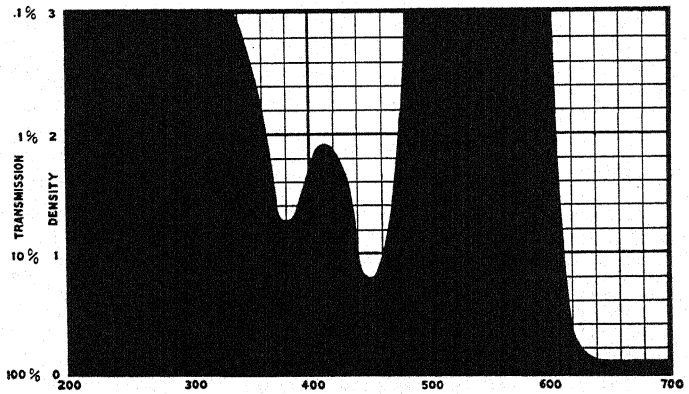
No. 30A. Q



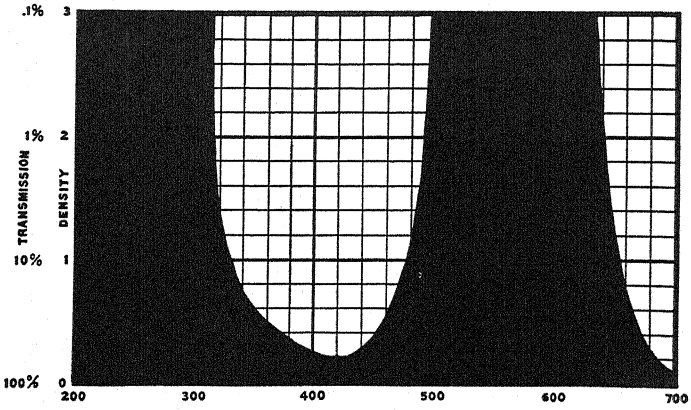
No. 31. Minus Green 1



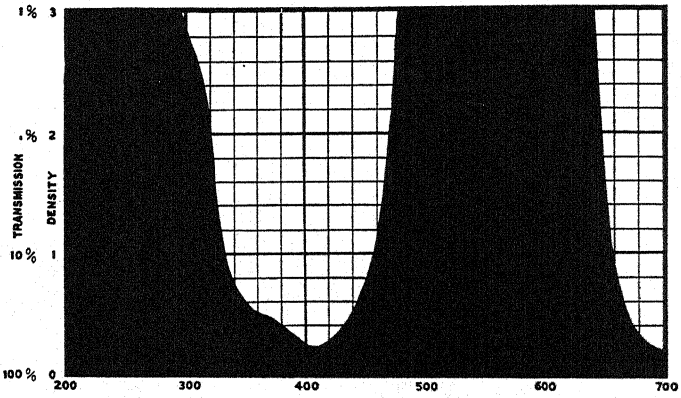
No. 32. Minus Green 3



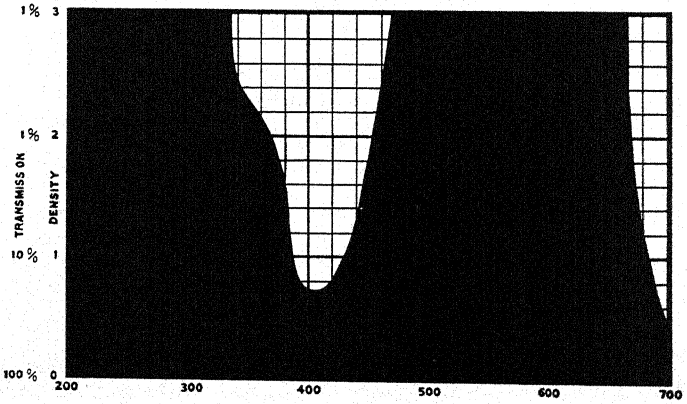
No. 33. Xylene Red



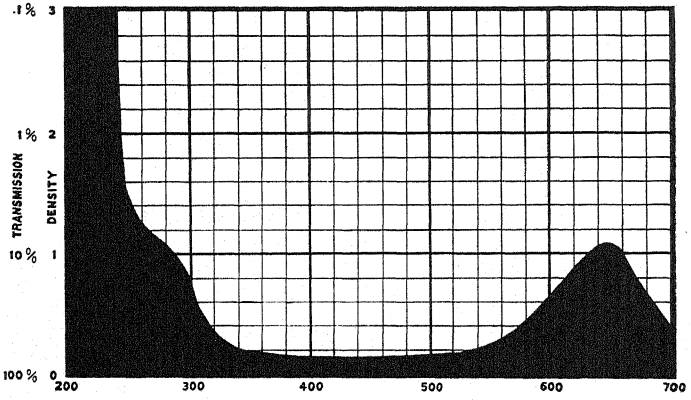
No. 34. D (light)



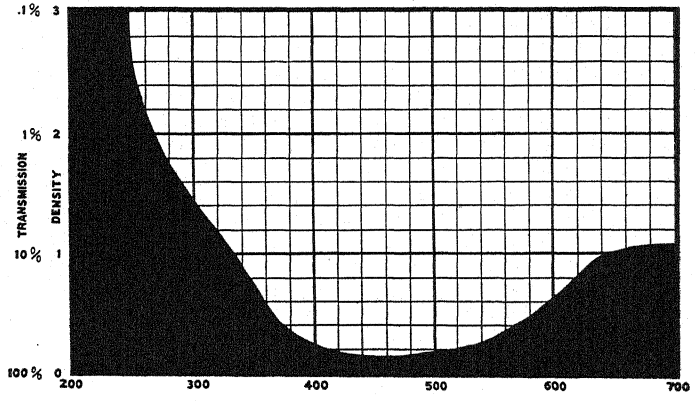
No. 35. D



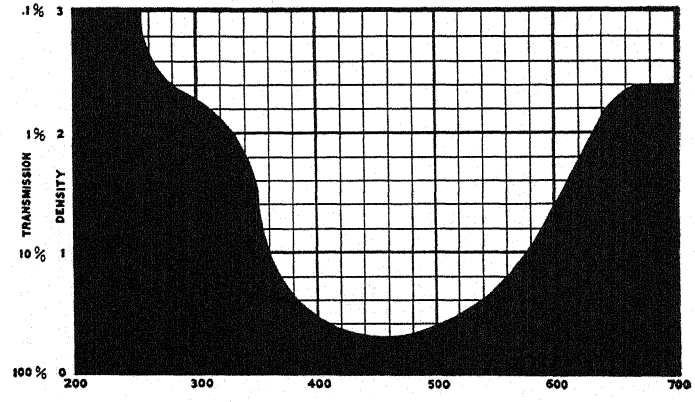
No. 36. Methyl Violet B. B. R.



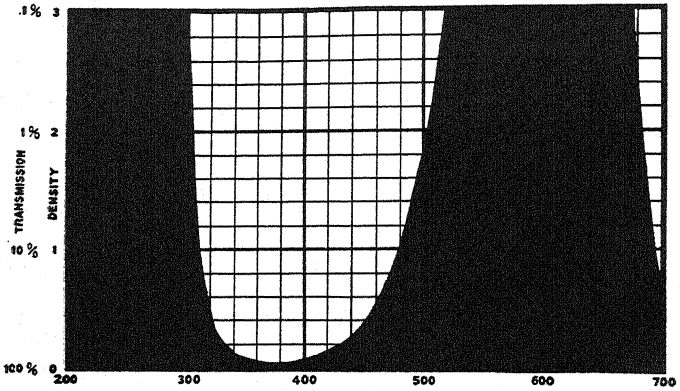
No. 37. βBlue



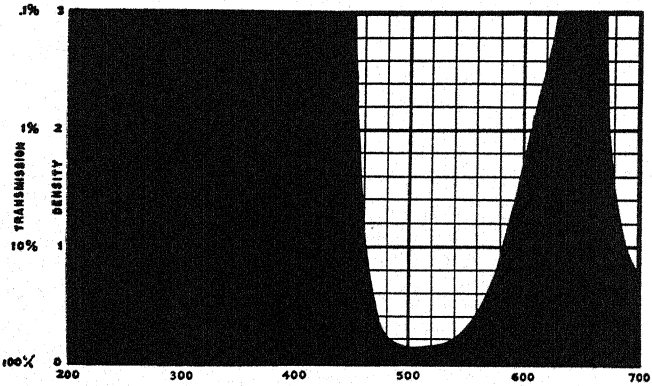
No. 38. Toluidine Blue



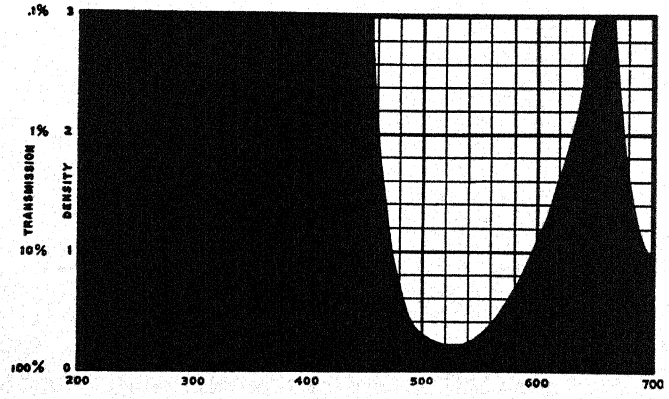
No. 38A. Dark Toluidine Blue



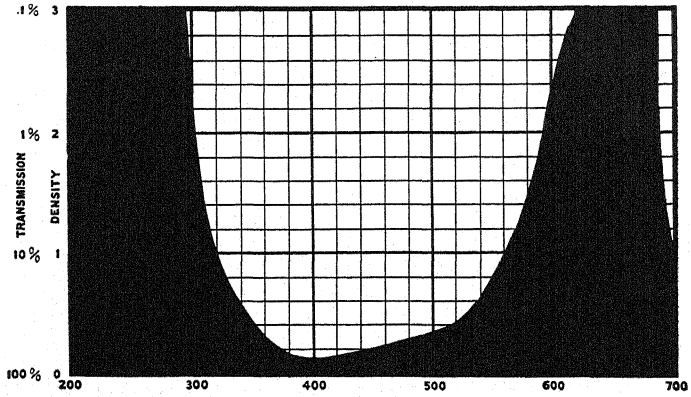
No. 39. Duplicating



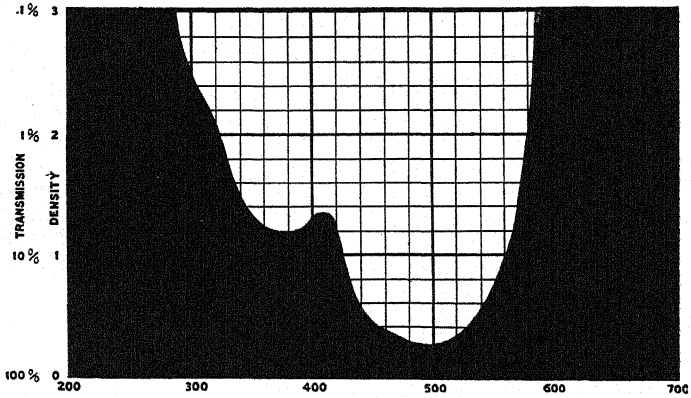
No. 40. Cine Green 1



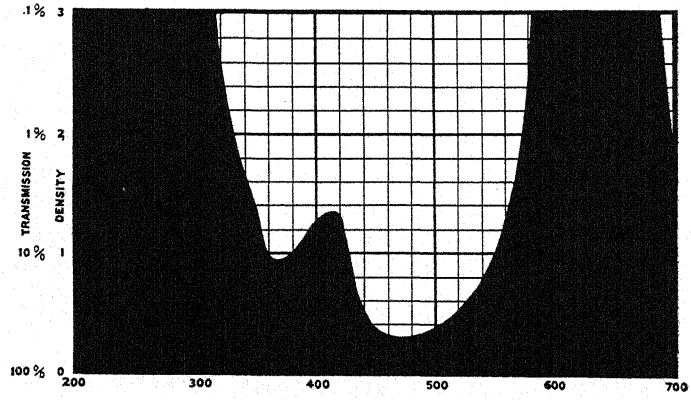
No. 40A. Cine Green 2



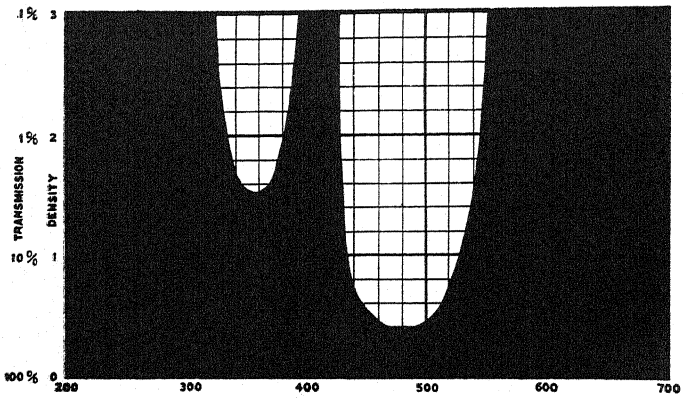
No. 43. Minus Red 2



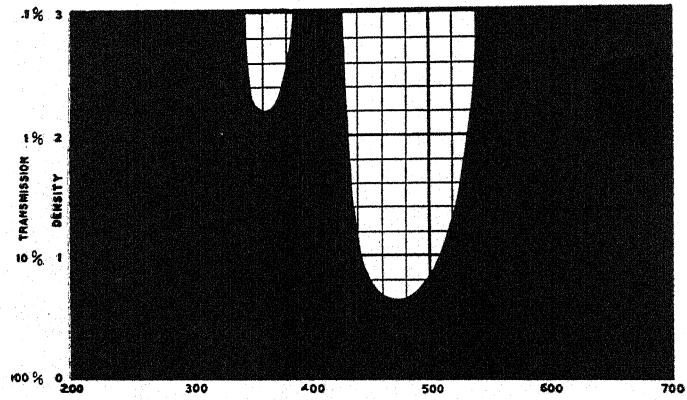
No. 44. Minus Red 4



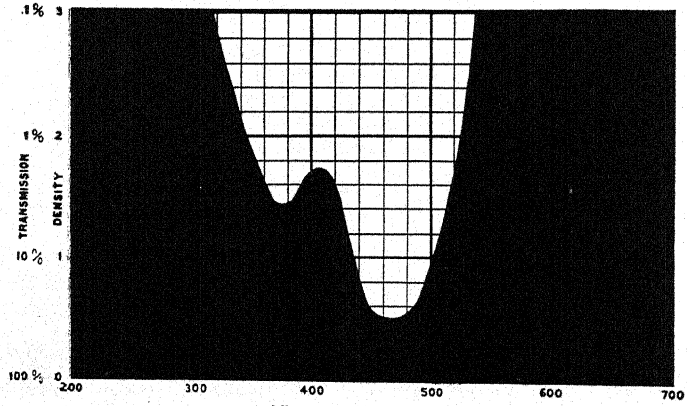
No. 44A. Minus Red 5



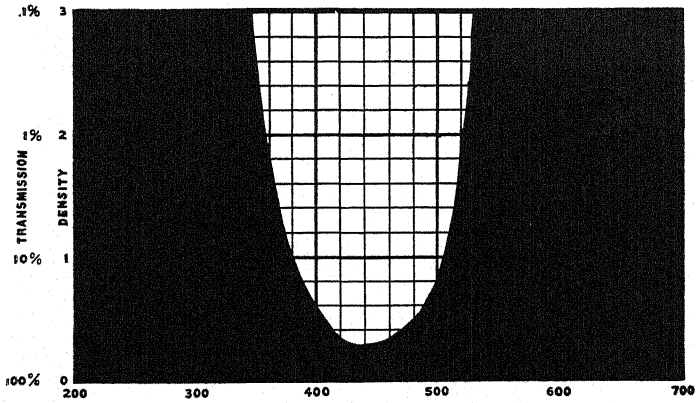
No. 45 H.



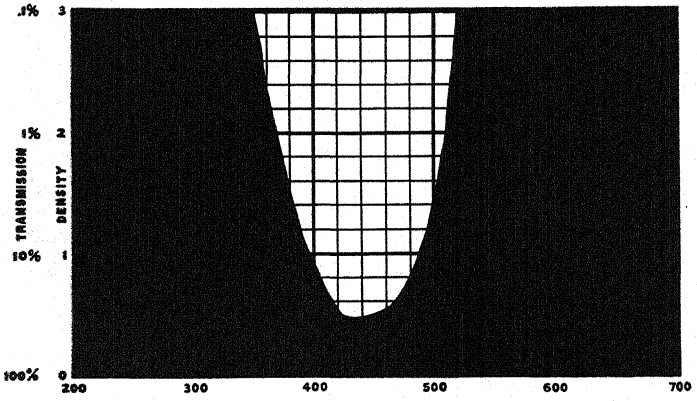
No. 45A. Blue Green for Microscopy



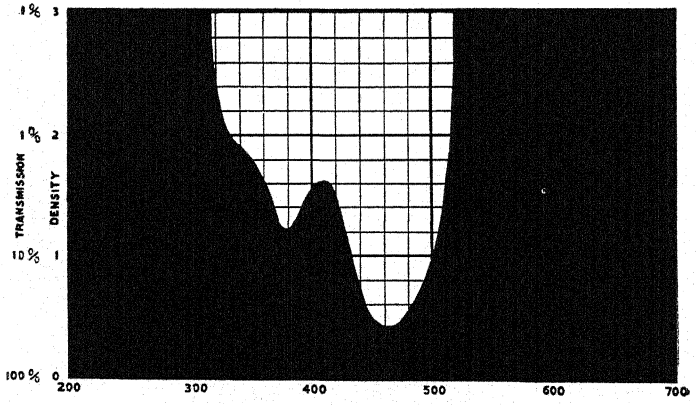
No. 46η. Blue



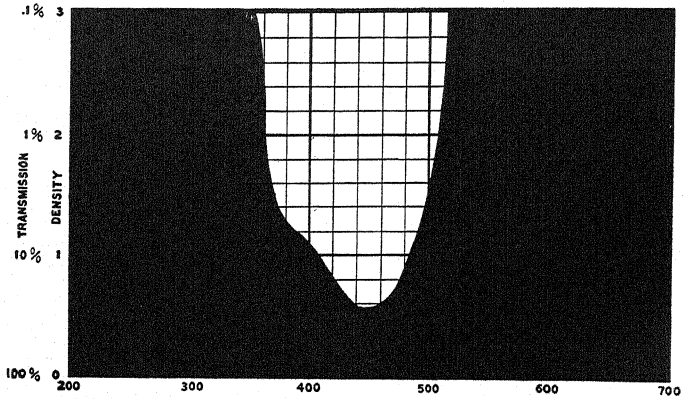
No. 47. Projection Blue



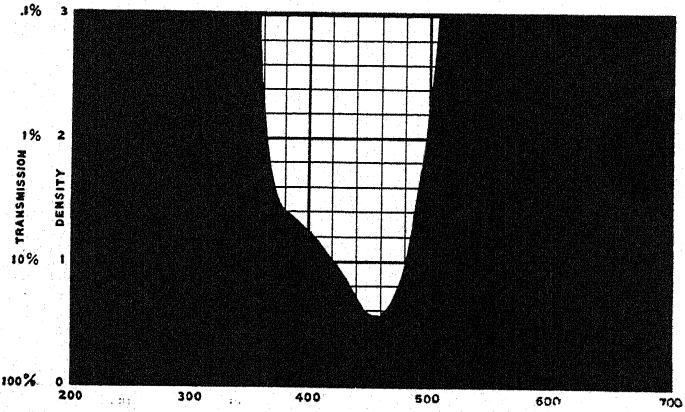
No. 47A. Stage Blue



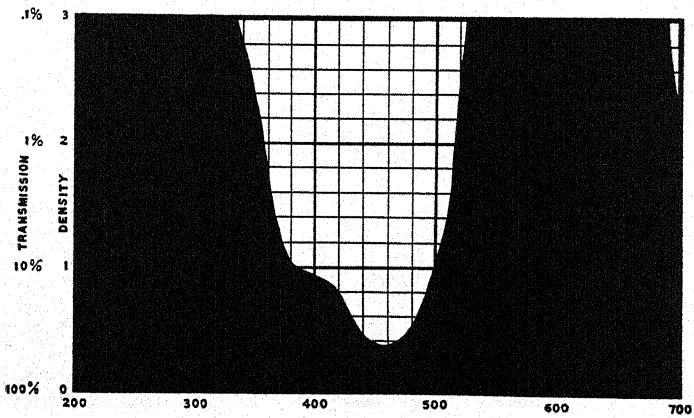
No. 48. C2



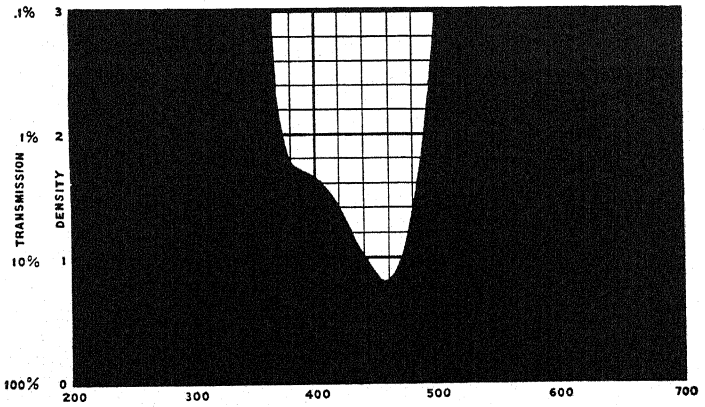
No 48A. C3



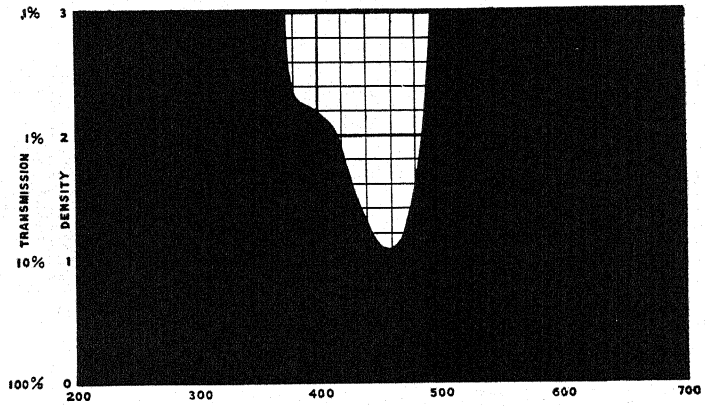
No. 49. C4



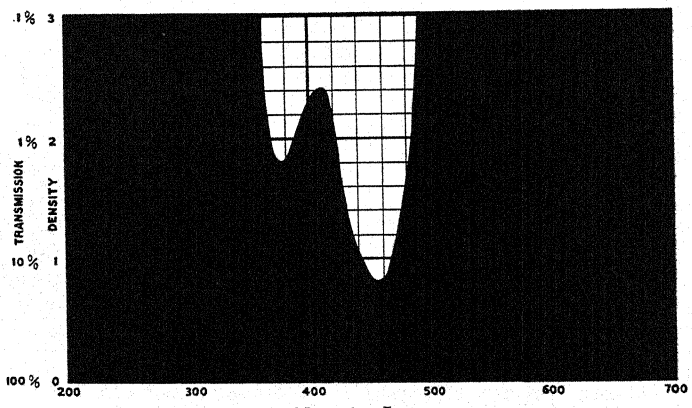
No. 49A. C4 (light)



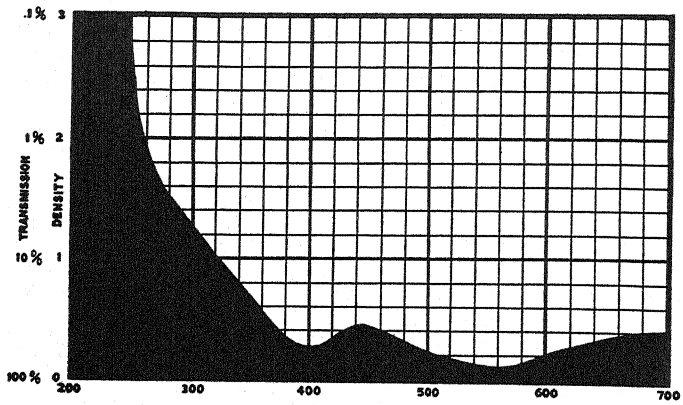
No. 49B. C4 (dark)



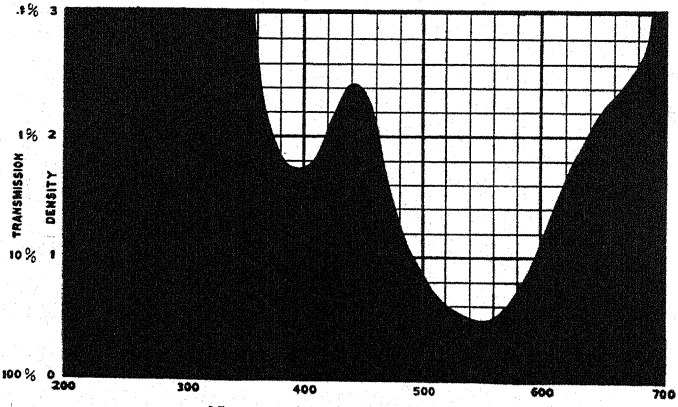
No. 49c. C4 (extra dark)



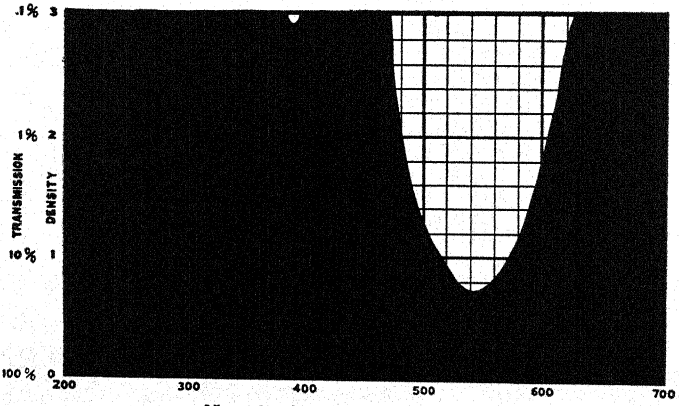
No 50. L



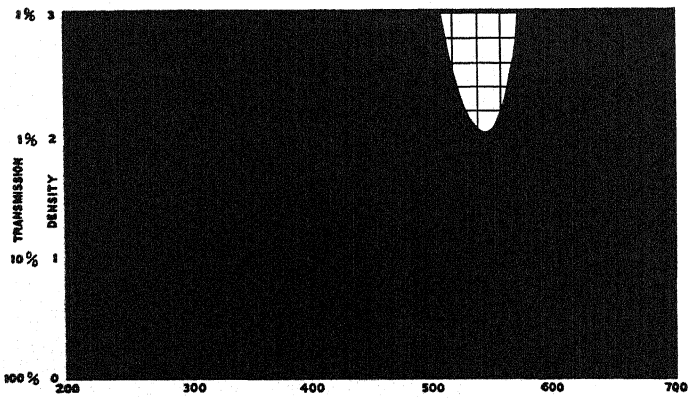
No. 51. Naphthol Green 1



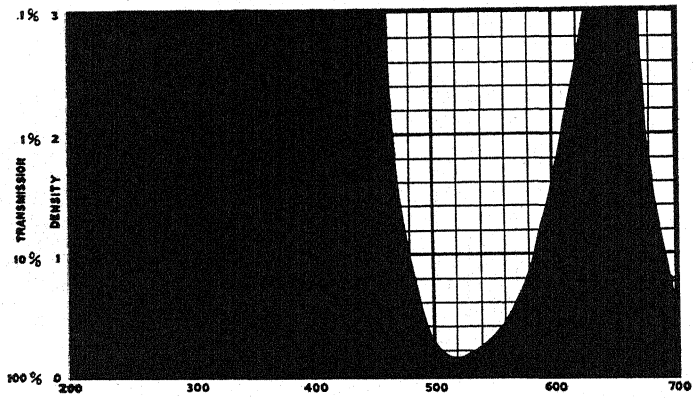
No. 52. Naphthol Green 2



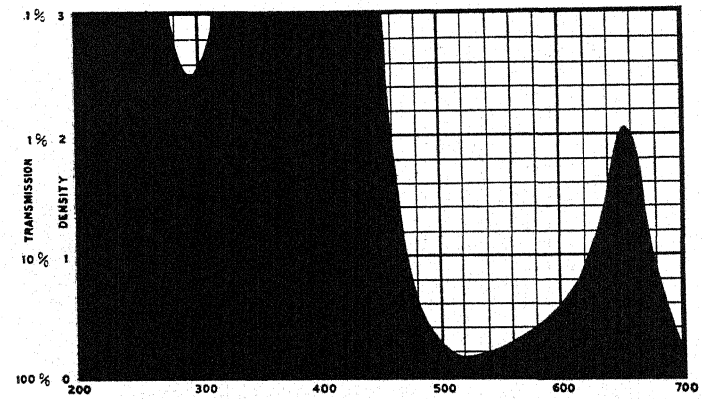
No. 53. Naphthol Green 3



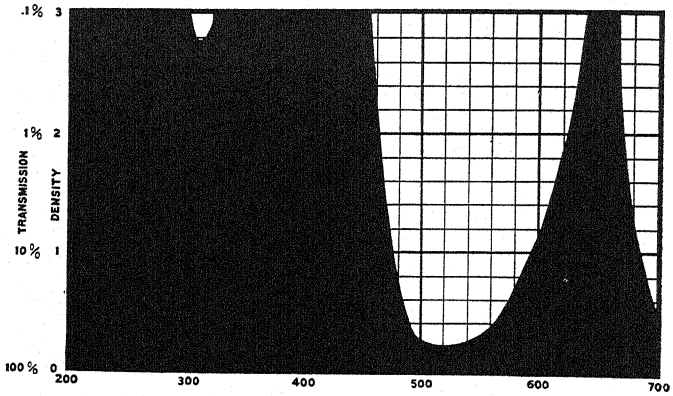
No. 54. Naphthol Green 4



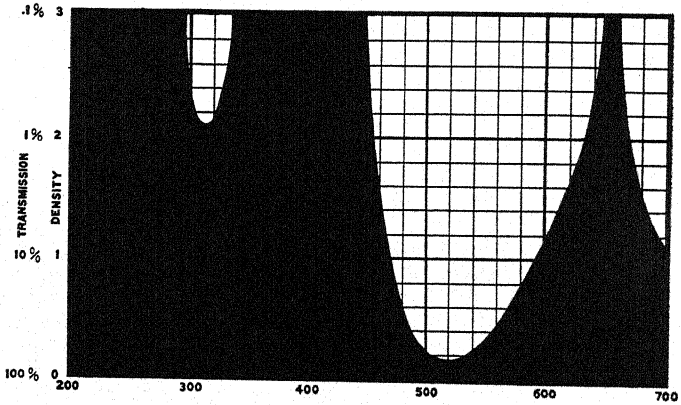
No. 55. Stereo Green



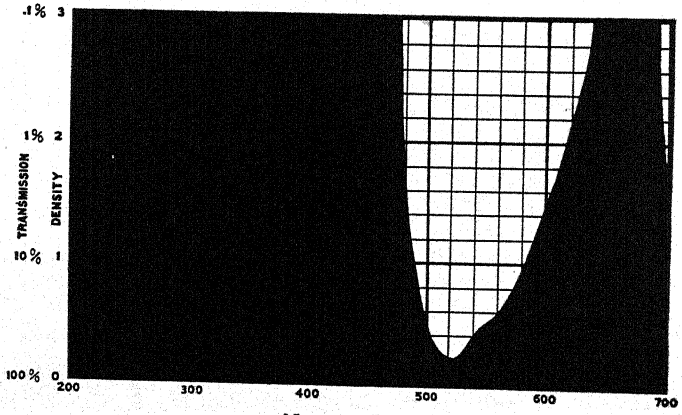
No. 56. B3



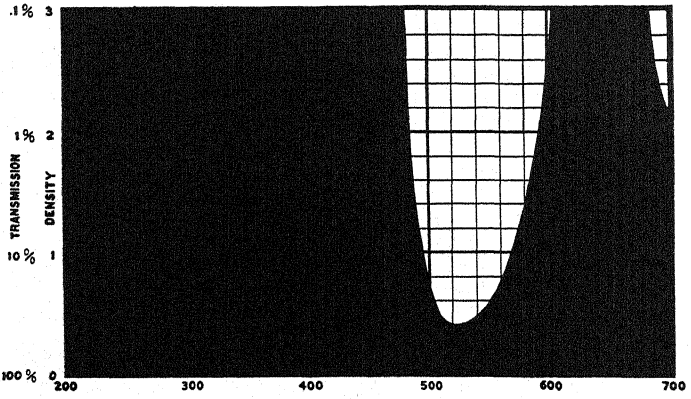
No. 57. B2 (light)



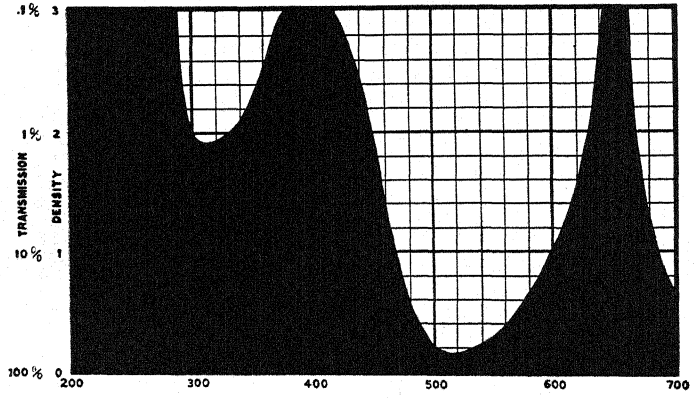
No. 57A. B2 (extra light)



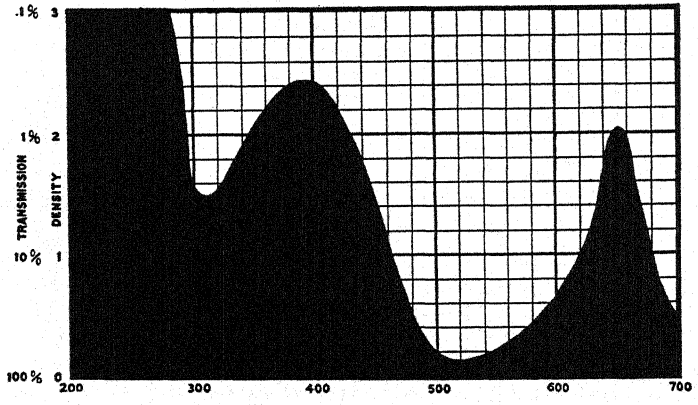
No. 58. B2



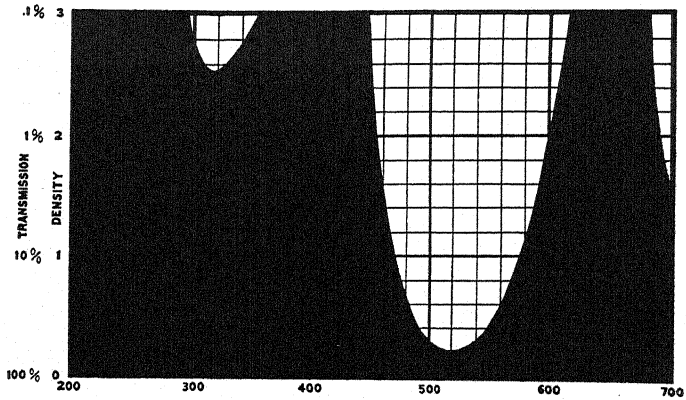
No. 58A. B2 (dark)



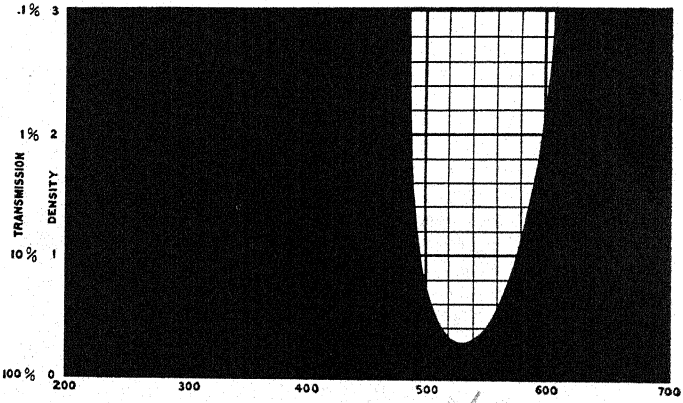
No. 59. Projection Green



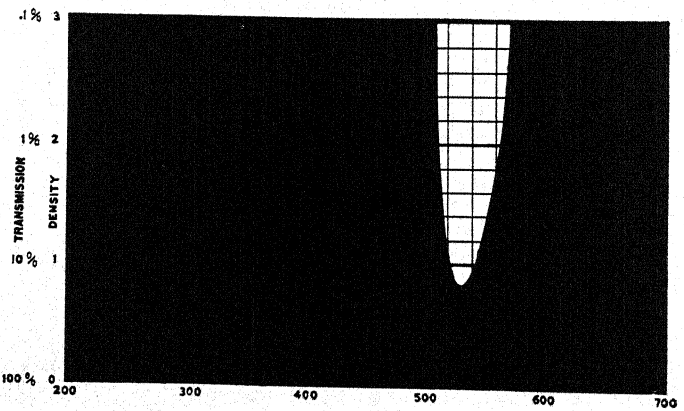
No. 59A. Projection Green (light)



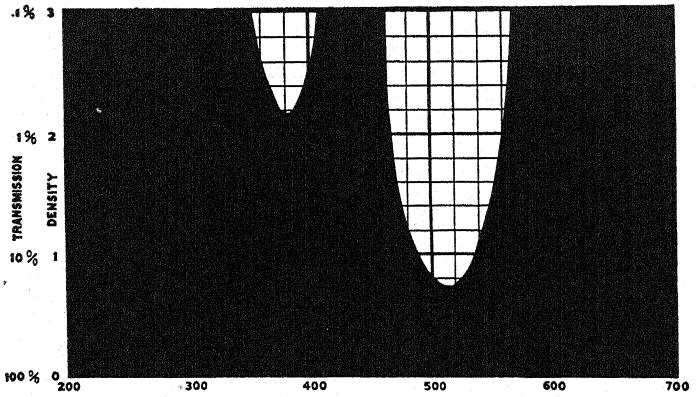
No. 60. P



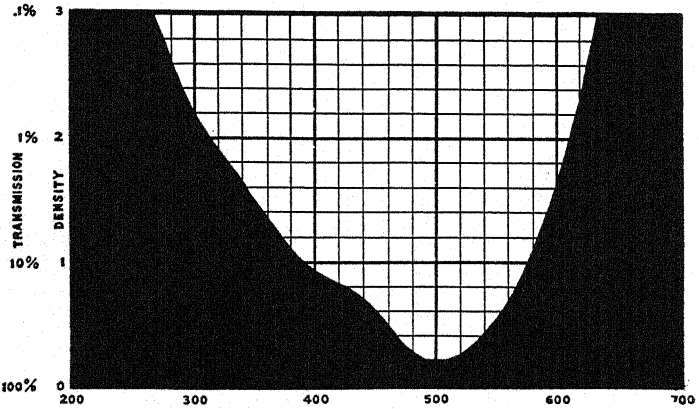
No. 61. N



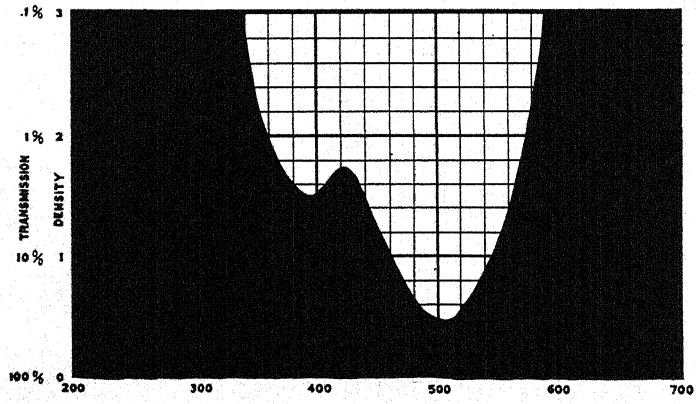
No. 62. Mercury Green



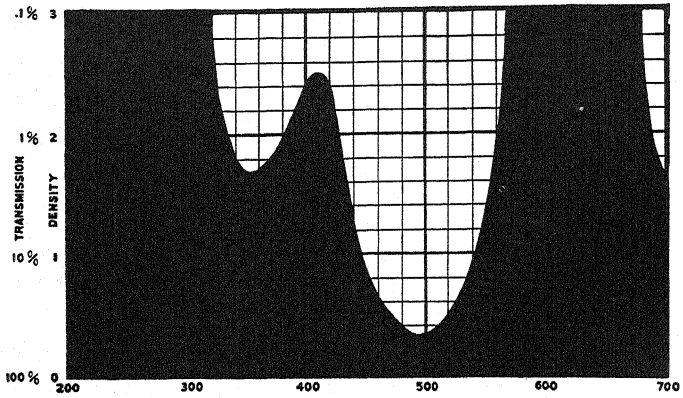
No. 63. ϵ-Green



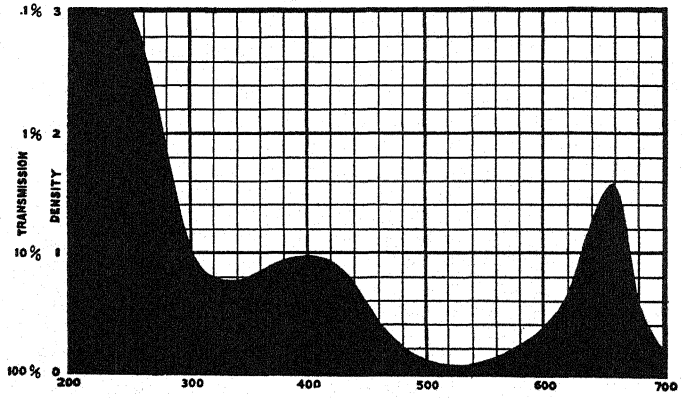
No. 64. Minus Red 3 (Light)



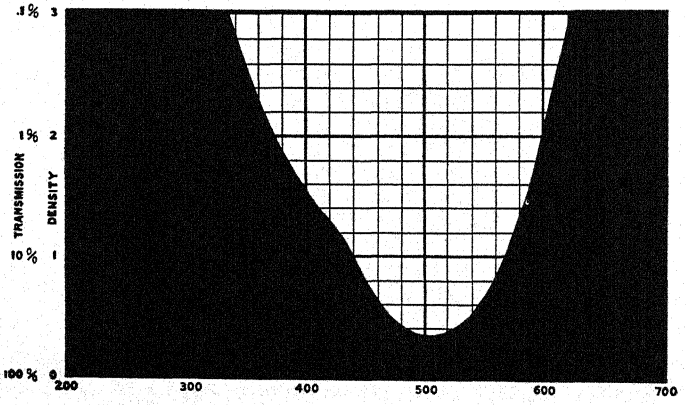
No. 65. Minus Red 3



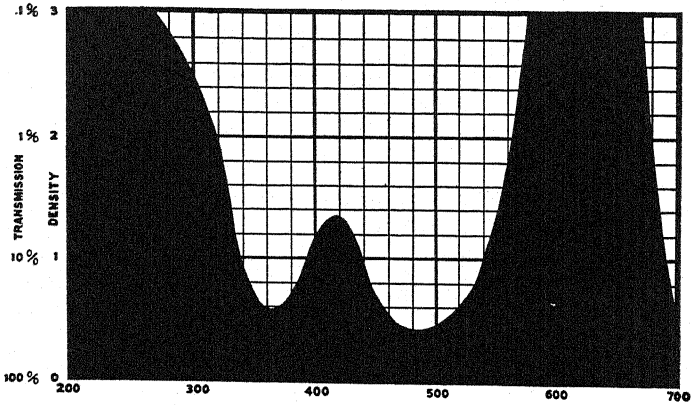
No. 65A. Minus Red 3 (intermediate)



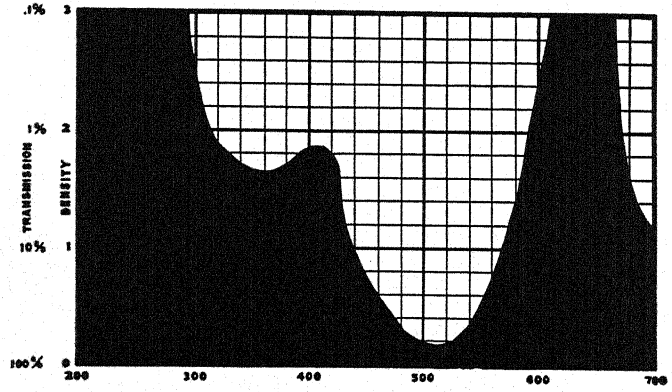
No. 66. Rapid Filter Green



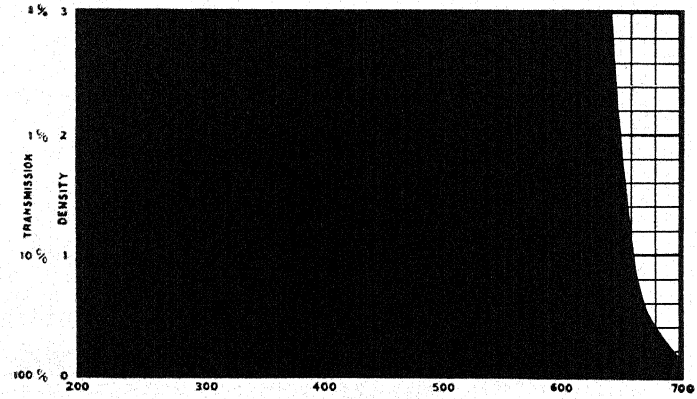
No. 67. Filter Blue Green



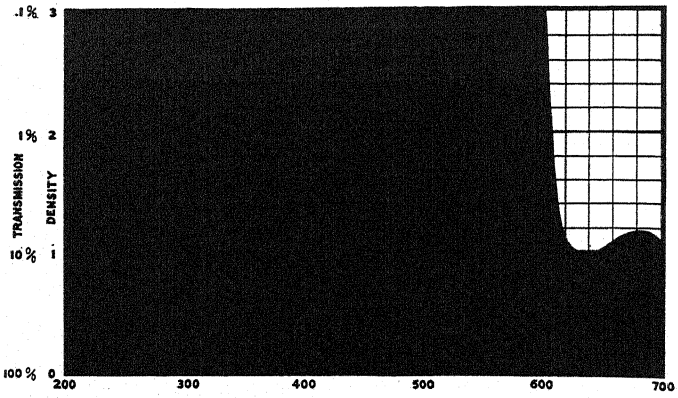
No. 68. Fast Green Blue Shade



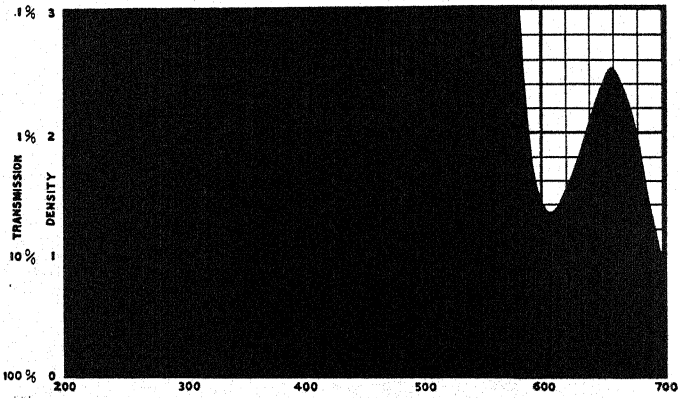
No. 69. 2-Color Blue Green



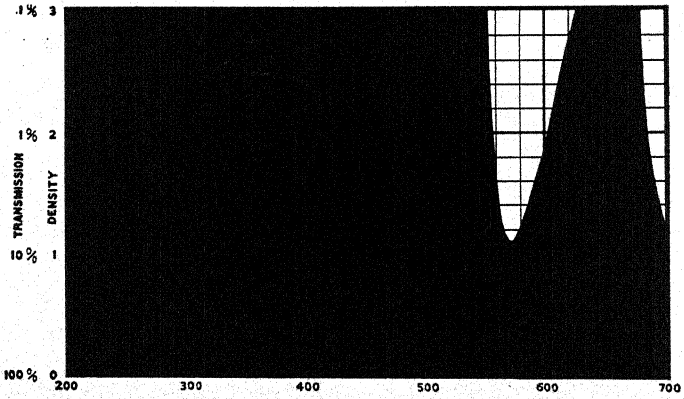
No. 70. *a*-(Contrast R)



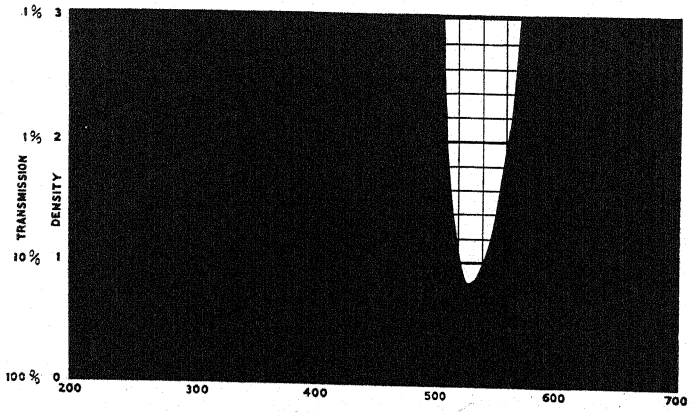
No. 71A. β



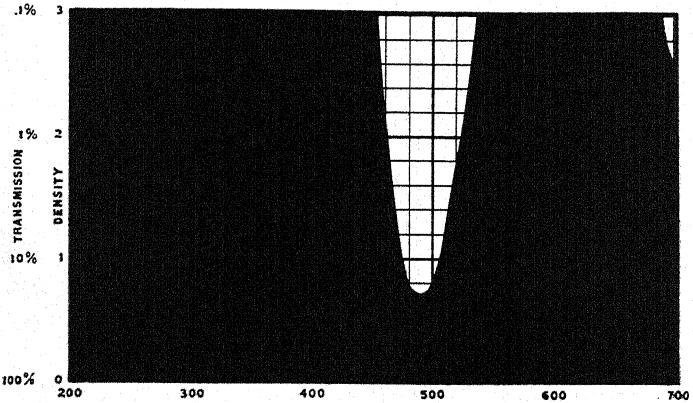
No. 72. γ



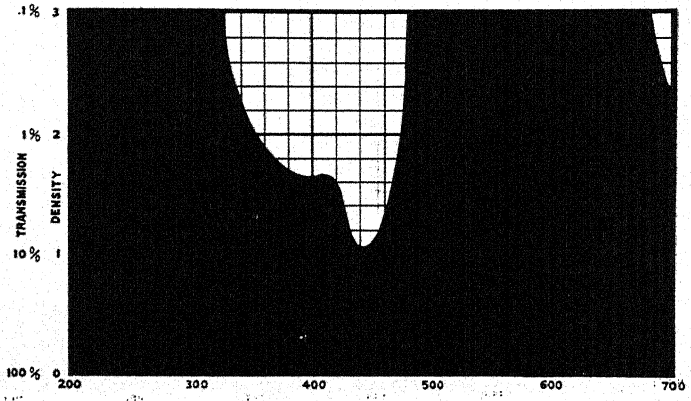
No. 73 δ



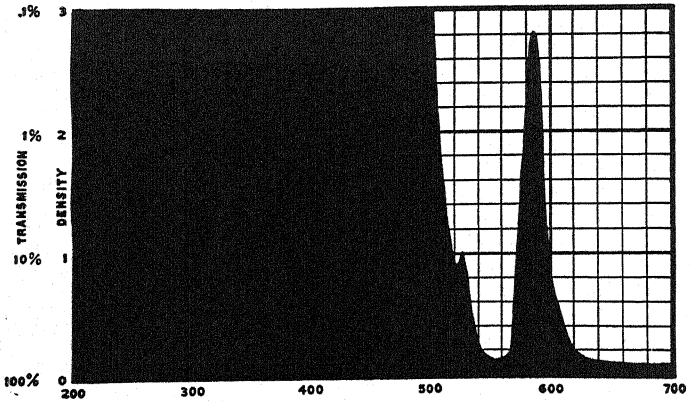
No. 74. ϵ



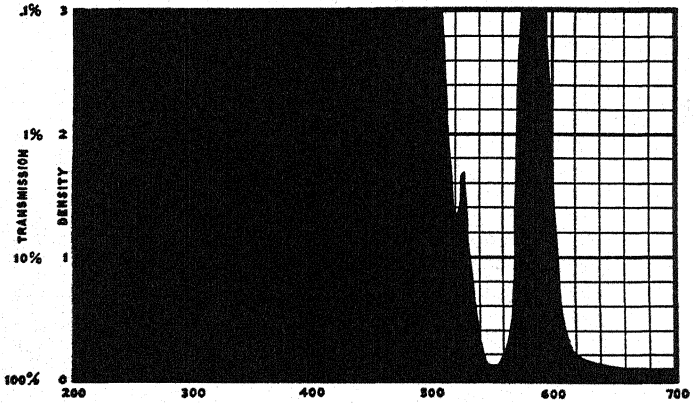
No. 75. η



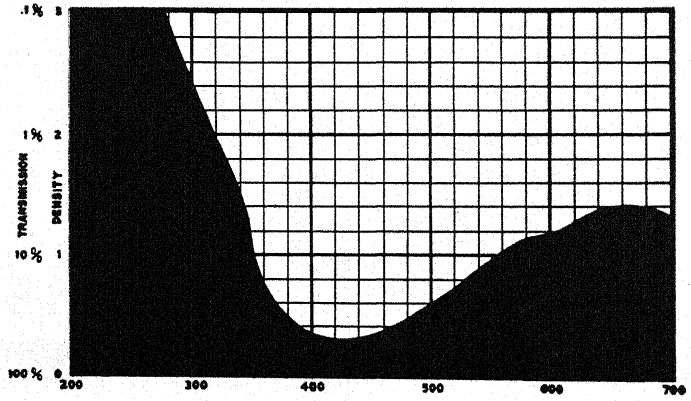
No. 76. θ



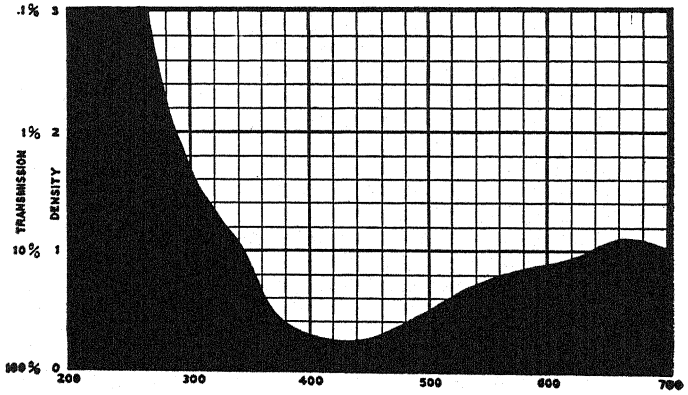
No. 77. Mercury Vapor Lamp Monochromat



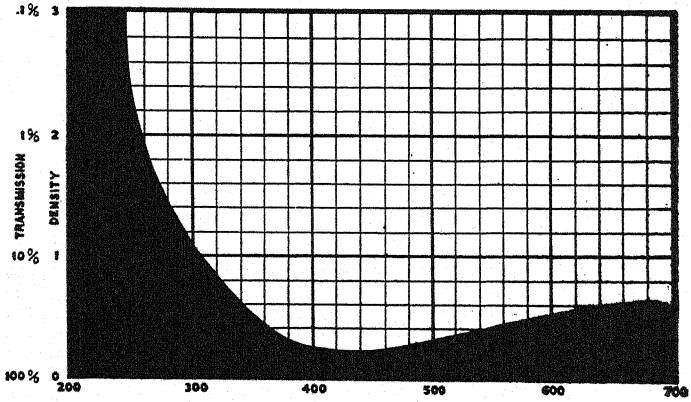
No. 77A. Mercury Vapor Lamp Monochromat



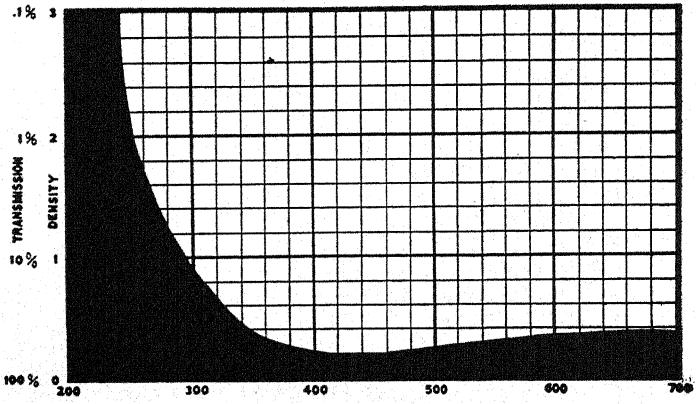
No. 78. Tungsten to Daylight (visual)



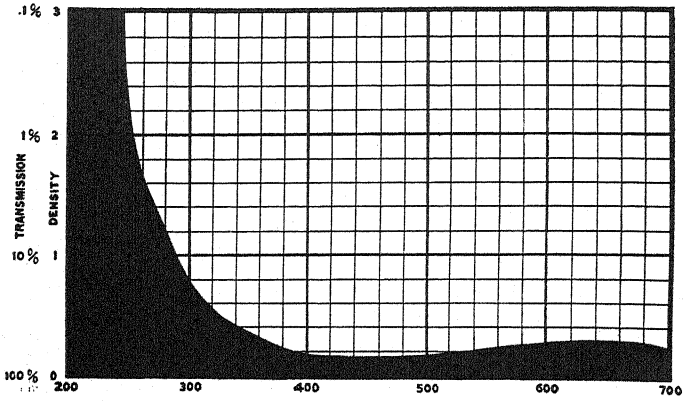
No. 78AA.



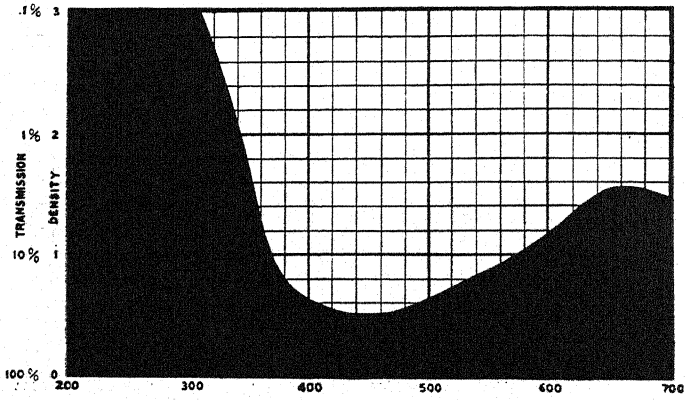
No. 78A. Photometric Bluish



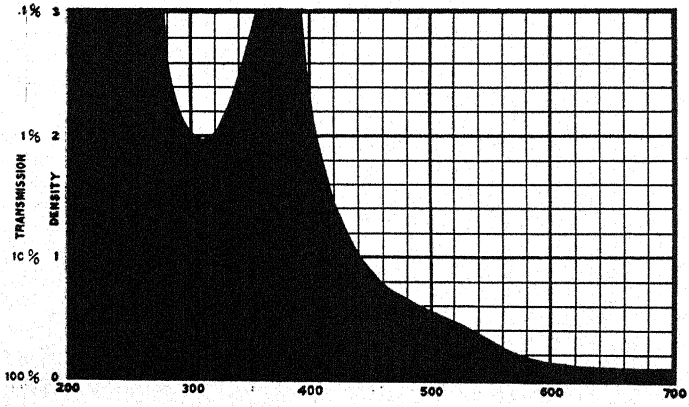
No. 78B. Photometric Bluish



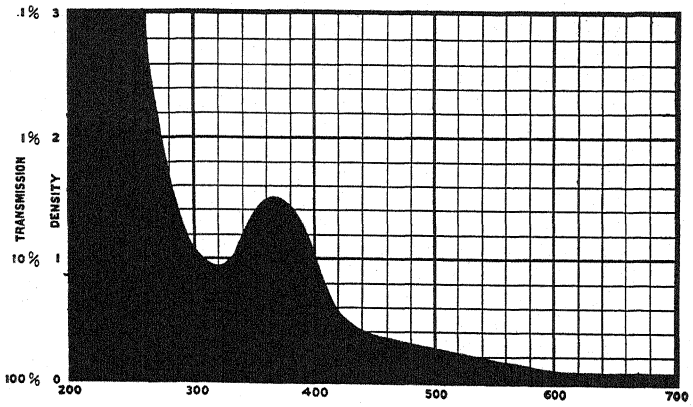
No. 78c. Photometric Bluish



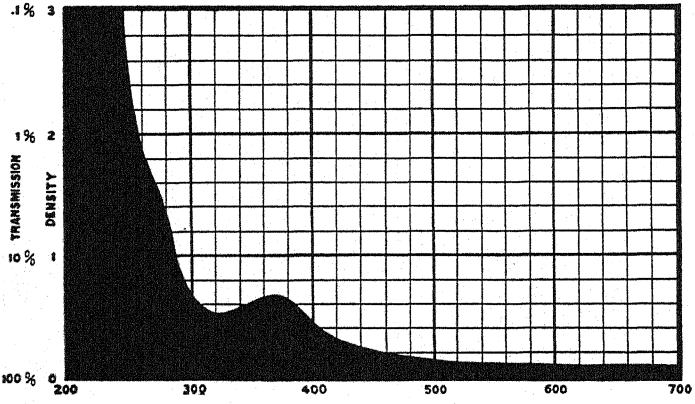
No. 79. Acetylene to Daylight



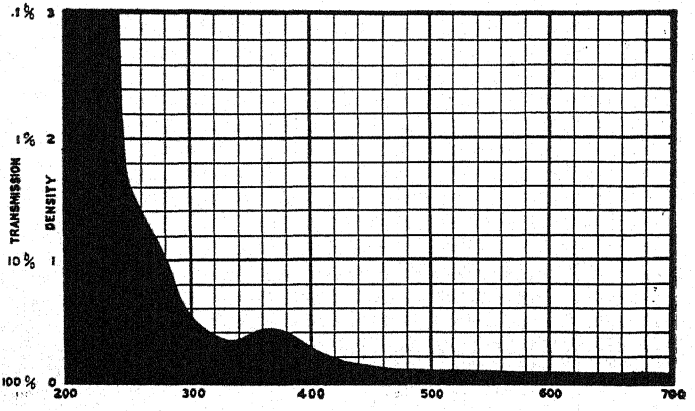
No. 86B Daylight to Tungsten



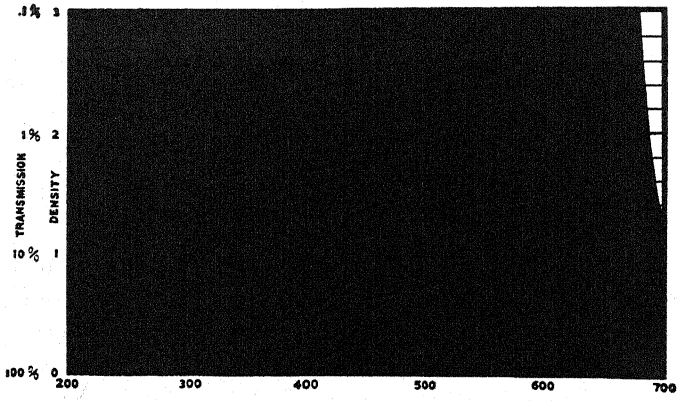
No. 86A. Photometric Yellowish



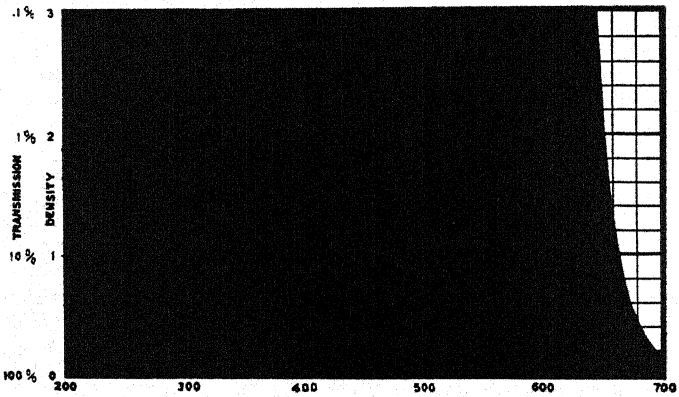
No. 86B. Photometric Yellow



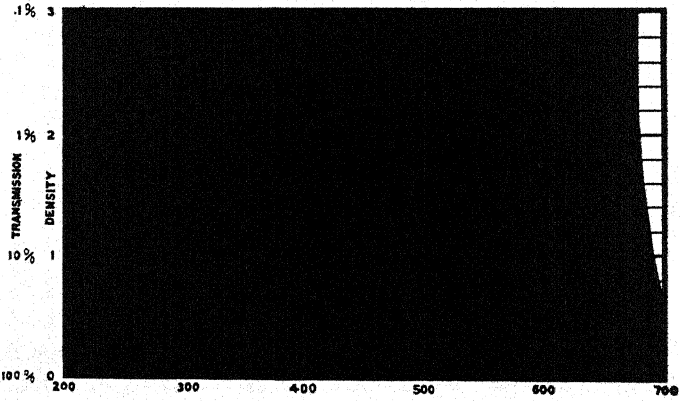
No. 86c. Photometric Yellowish



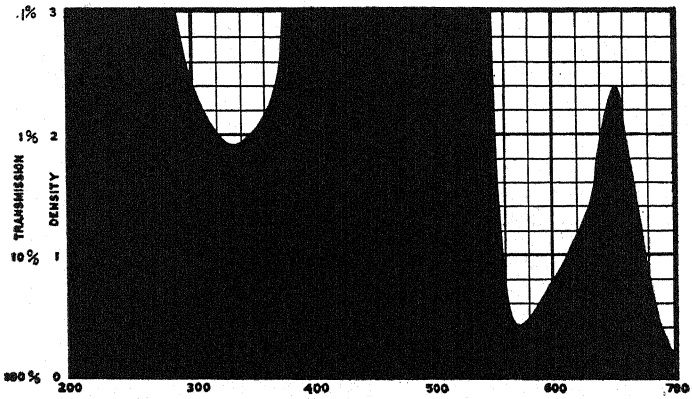
No. 88. Infra Red as used by Prof. R. W. Wood



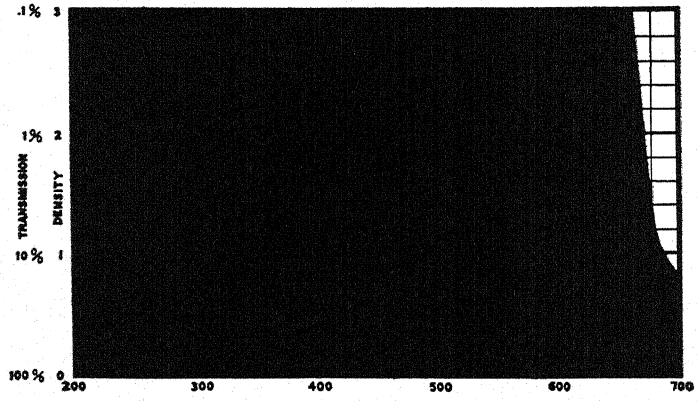
No. 89. Signaling Red



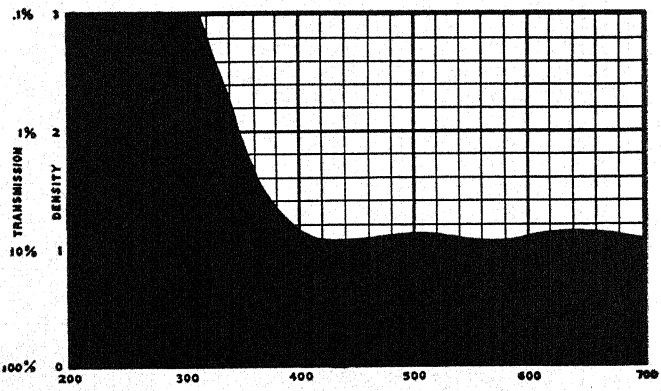
No. 89A. Signaling Red (dark)



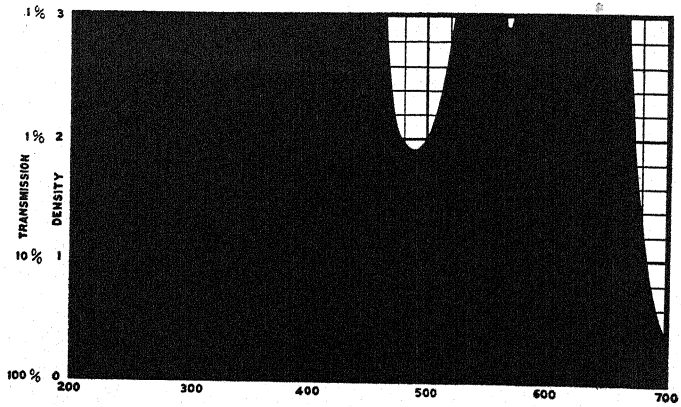
No. 90. Monochromatic Viewing Filter



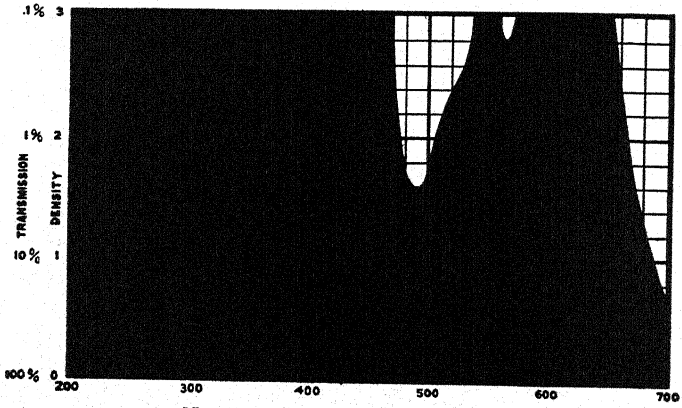
No. 91. Z (Infra Red) (compound)



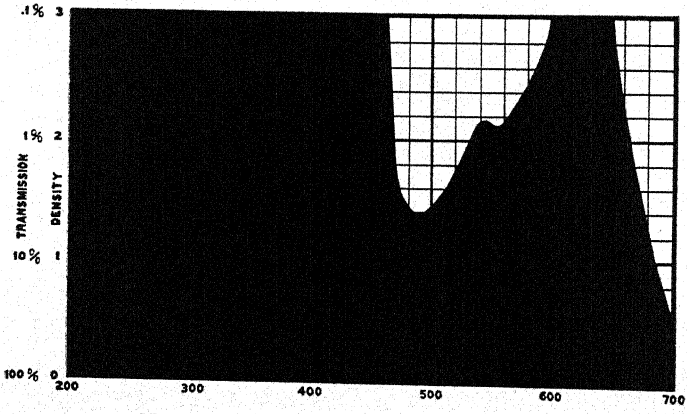
No. 96. Neutral Gray (mean visible density 1.08)



No. 97. Dichroic Filter

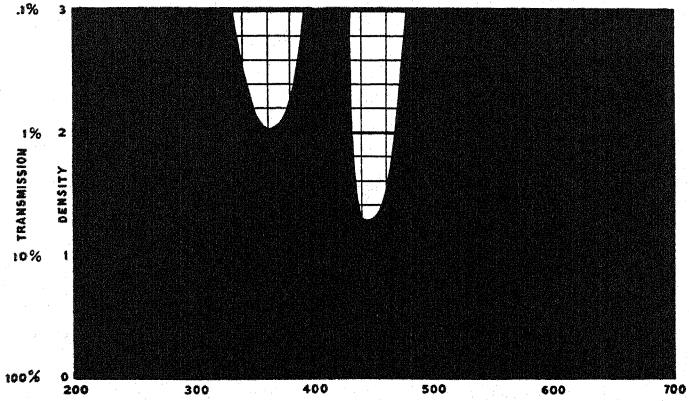


No. 97A. Dichroic Filter (light)

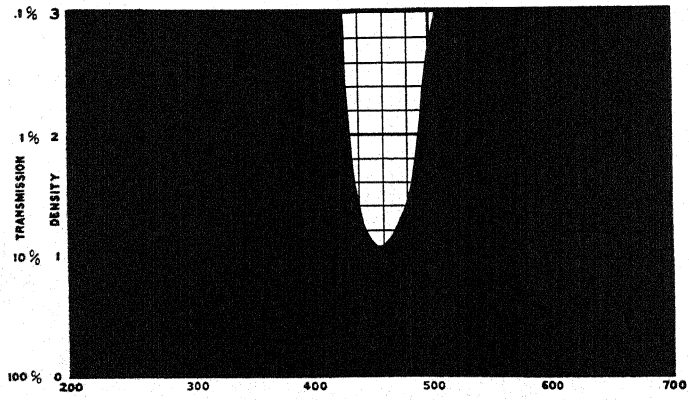


No. 97B. Dichroic Filter (extra light)

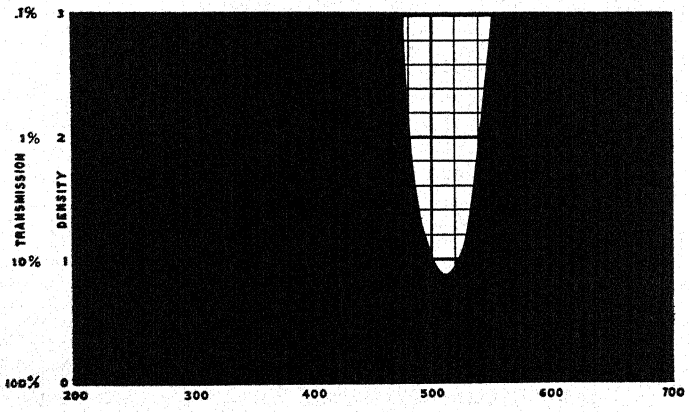
Absorptions of Certain Pairs of Filters



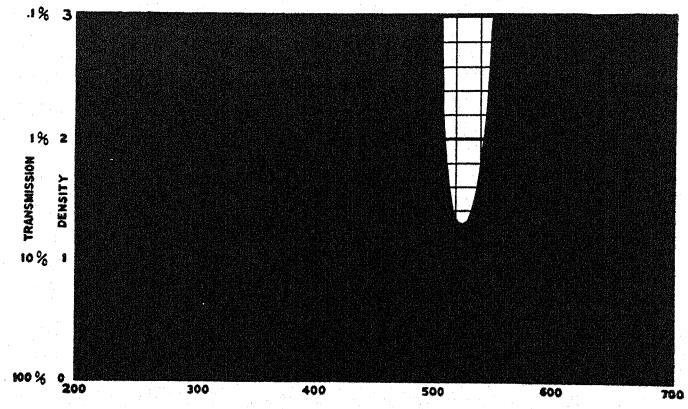
D & H



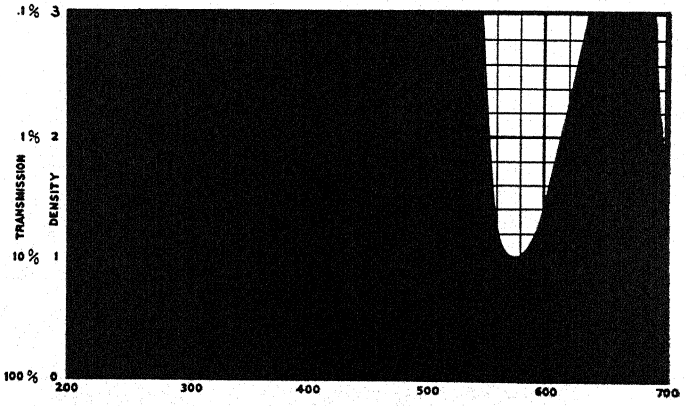
C & H



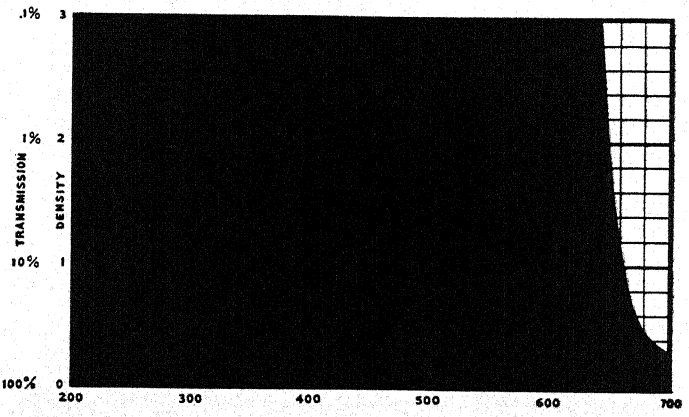
B & H


.1% 3
1% 2
10% 1
100% 0
TRANSMISSION
DENSITY
200
300
400
500
600
700

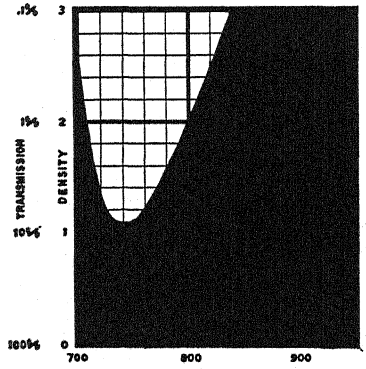
G & H


.1% 3
1% 2
10% 1
100% 0
TRANSMISSION
DENSITY
200
300
400
500
600
700

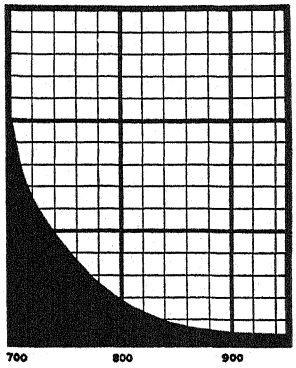
B & E


.1% 3
1% 2
10% 1
100% 0
TRANSMISSION
DENSITY
200
300
400
500
600
700

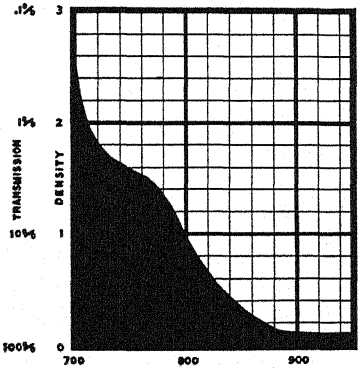
A & D



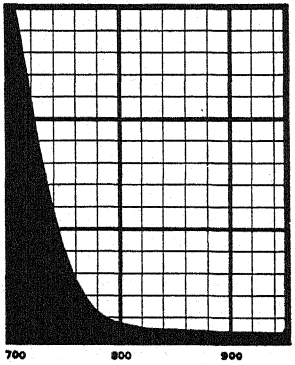
No. 18A Ultra-Violet



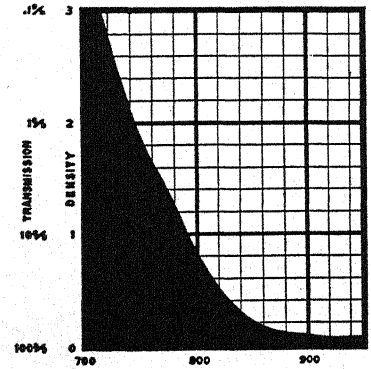
No 44A Minus Red 5



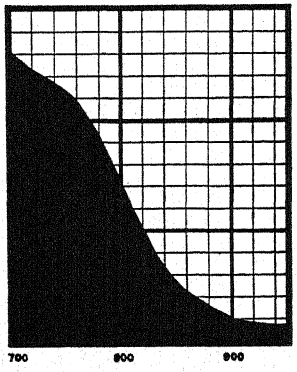
No. 45. H



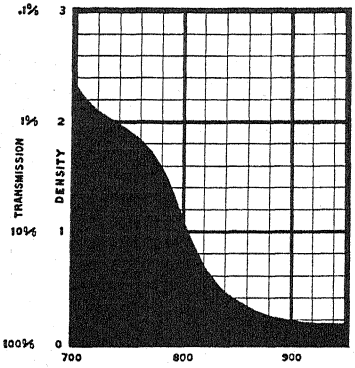
No. 49. C4



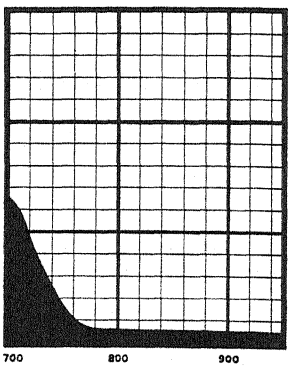
No. 74. ϵ



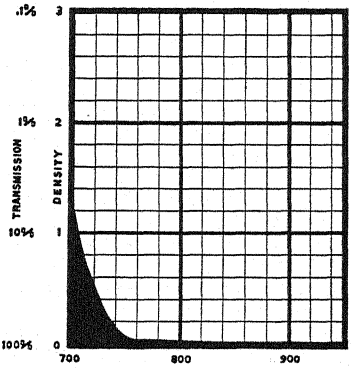
No. 75. η



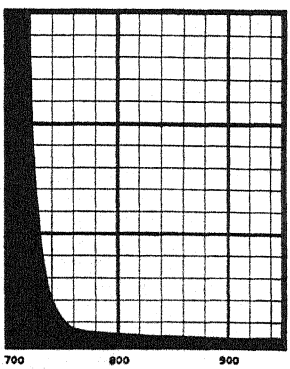
No. 76. θ



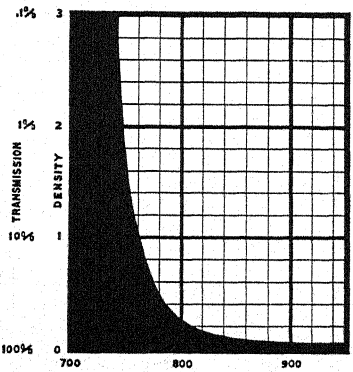
No. 78



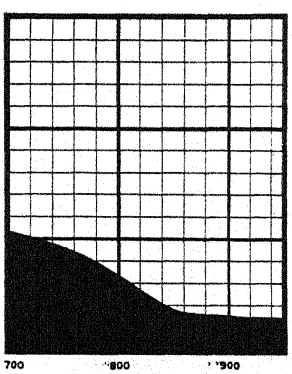
No. 88. Infra-Red



No. 88A. Infra-Red



No. 87. Infra-Red



No. 96. Neutral Gray

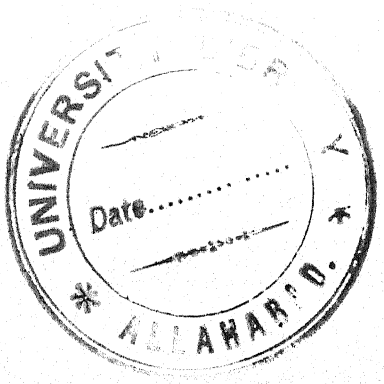
PERCENTAGE TRANSMISSION

Filter No.:		0	1	2	3	4	6	7	8
Total Transmission:		90.0	90.0	90.0	89.0	86.0	89.0	86.0	83.0
Wave Length									
400	...	85.0	61.5	30.0	....	....	14.4	.24	....
10	...	"	66.5	46.8	....	....	15.8	.31	....
20	...	"	78.8	62.8	....	....	18.2	.62	....
30	...	"	84.5	76.6	....	....	22.3	1.2	....
40	...	"	"	84.6	....	....	28.7	2.4	....
50	...	"	"	"	4.0	....	37.8	5.0	....
60	...	"	"	"	39.9	2.5	49.0	11.5	1.6
70	...	"	"	"	70.4	56.0	59.3	26.8	10.0
80	...	"	"	"	82.2	70.4	67.4	42.5	25.1
90	...	"	"	"	84.2	77.7	72.9	56.4	43.8
500	...	85.0	84.5	85.0	85.0	81.1	77.7	67.4	58.8
10	...	"	"	"	"	"	"	70.4	68.9
20	...	"	"	"	"	"	"	"	74.0
30	...	"	"	"	"	"	"	"	"
40	...	"	"	"	"	"	"	"	"
50	...	"	"	"	"	"	"	"	"
60	...	"	"	"	"	"	"	"	"
70	...	"	"	"	"	"	"	"	"
80	...	"	"	"	"	"	"	"	"
90	...	"	"	"	"	"	"	"	"
600	...	85.0	84.5	85.0	85.0	82.7	79.9	76.1	78.3
10	...	"	"	"	"	"	"	"	"
20	...	"	"	"	"	"	"	"	"
30	...	"	"	"	"	"	"	"	"
40	...	"	"	"	"	"	"	"	"
50	...	"	"	"	"	"	"	"	"
60	...	"	"	"	"	"	"	"	"
70	...	"	"	"	"	"	"	"	"
80	...	"	"	"	"	"	"	"	"
90	...	"	"	"	"	"	"	"	"
700	...	85.0	84.5	85.0	85.0	82.7	79.9	76.1	78.3

Filter No.:		9	12	15	16	17	18A	21	22
Total Transmission:									
		80.0	77.0	74.0	64.0	....	....	58.0	47.0
Wave Length 400	...	....	....	....	....	1.59	....	....	....
10	...	....	....	....	....	.50	....	....	....
20	...	....	....	....	....	.12	....	....	....
30	...	....	....	....	....	.05	....	....	....
40	...	....	....	....	....	.07	....	....	....
50	...	....	....	....	....	.25	....	....	....
60	...	....	....	....	....	1.97	....	....	....
70	...	2.5	....	....	....	31.62	....	....	....
80	...	10.0	....	....	....	85.0	....	....	....
90	...	21.4	....	....	....	....	....	....	....
500	...	33.3	2.5	....	....	85.0	....	....	....
10	...	46.8	20.2	2.6	....	"	....	....	....
20	...	58.8	50.1	29.0	.10	"	....	....	....
30	...	68.9	64.6	57.6	25.1	"	....	....	....
40	...	75.5	72.4	74.5	52.4	"	....	4.44	....
50	...	78.3	75.6	78.8	73.9	"	....	25.1	.64
60	...	"	"	"	81.6	"	....	60.2	23.4
70	...	"	"	"	"	"	....	76.0	54.9
80	...	"	"	"	"	"	....	81.2	70.8
90	...	"	"	"	"	"	....	82.2	74.0
600	...	78.3	75.6	79.4	82.8	85.0	....	82.9	76.0
10	...	"	"	"	"	"	....	"	77.7
20	...	"	"	"	"	"	....	"	79.4
30	...	"	"	"	"	"	....	"	81.2
40	...	"	"	"	"	"	....	"	82.9
50	...	"	"	"	"	"	....	"	"
60	...	"	"	"	"	"	....	"	"
70	...	"	"	"	"	"	....	"	"
80	...	"	"	"	"	"	....	"	"
90	...	"	"	"	"	"	....	"	"
700	...	78.3	75.6	79.4	83.0	85.0	....	82.9	82.9

Wave Length	Filter No.: 23	23A	23B	24	24A	25	26	27
Total Transmission:	33.0	38.0	24.0	24.0	26.0	22.0	22.0	23.0
400 ...	....	....	....	....	....	....	....	....
10 ...	....	....	....	....	....	....	....	....
20 ...	....	....	....	....	....	....	....	....
30 ...	....	....	....	....	....	....	....	....
40 ...	....	....	....	....	....	....	....	....
50 ...	....	....	....	....	....	....	....	....
60 ...	....	....	....	....	....	....	....	....
70 ...	....	....	....	....	....	....	....	....
80 ...	....	....	....	....	....	....	....	....
90 ...	....	....	....	....	....	....	....	....
500 ...	....	....	....	....	....	....	....	....
10 ...	....	....	....	....	....	....	....	....
20 ...	....	....	....	....	....	....	....	....
30 ...	....	....	....	....	....	....	....	....
40 ...	....	....	....	....	....	....	....	....
50 ...	....	....	....	....	....	....	....	....
60 ...	....	.10	....	....	....	....	....	....
70 ...	2.5	19.8	3.2	....	.25	....	....	....
80 ...	34.7	56.4	20.2	3.99	15.1	.16	....	1.26
90 ...	66.5	69.9	44.5	34.6	49.0	10.2	3.17	33.0
600 ...	76.1	76.1	57.0	60.2	68.7	50.1	33.1	61.9
10 ...	"	"	61.5	72.4	74.0	64.6	60.2	73.9
20 ...	"	"	62.4	76.0	76.0	72.4	74.0	78.3
30 ...	"	"	"	77.7	"	74.0	76.0	"
40 ...	"	"	"	79.4	"	76.0	77.7	"
50 ...	"	"	"	"	"	77.7	79.4	"
60 ...	"	"	"	"	"	79.4	"	"
70 ...	"	"	"	"	"	"	"	"
80 ...	"	"	"	"	"	"	"	"
90 ...	"	"	"	"	"	"	"	"
700 ...	77.7	79.9	63.2	79.4	76.0	79.4	79.4	79.4

Wave Length	Filter No.:	27A	28	29	30	30A	31	32	33
	Total Transmission:	30.0	22.7	6.6	42.0	32.0	18.0	19.0	7.8
	400 ...	....	....	....	63.3	4.44	16.2	42.8	1.8
	10 ...	....	....	....	61.4	4.4	15.8	47.9	1.26
	20 ...	....	....	....	57.6	4.1	20.8	53.6	1.4
	30 ...	....	....	....	52.8	3.6	28.2	60.1	2.2
	40 ...	....	....	....	45.8	3.1	38.9	65.1	10.0
	50 ...	....	....	....	38.1	1.9	46.8	66.5	15.8
	60 ...	....	....	....	29.5	.99	39.7	63.1	10.0
	70 ...	....	....	....	18.2	.12	19.9	52.8	3.1
	80 ...	....	....	....	6.6	....	6.60	40.0	.10
	90 ...	....	....	....	1.26	....	.99	26.4	....
	500 ...	....	....	....	....	....	....	13.8	....
	10 ...	....	....	....	....	....	....	3.99	....
	20 ...	....	....	....	....	....	....	.62	....
	30 ...	....	....	....	....	....	....	....	....
	40 ...	....	0.10	....	....	....	....	....	....
	50 ...	....	.17	....	....	....	....	....	....
	60 ...	.40	.38	....	4.0	1.0	....	....	....
	70 ...	8.0	2.40	....	31.6	10.9	....	....	....
	80 ...	27.6	10.9	....	63.1	33.0	....	....	....
	90 ...	46.8	31.5	....	74.0	56.4	1.26	1.6	....
	600 ...	63.1	54.8	.39	79.4	67.5	....	31.6	....
	10 ...	72.4	68.9	6.3	....	72.9	22.3	63.1	3.0
	20 ...	76.6	77.7	31.6	....	76.1	34.9	76.1	39.6
	30 ...	"	78.8	50.1	"	"	76.0	79.4	67.5
	40 ...	"	79.4	62.8	"	"	79.4	"	79.4
	50 ...	"	80.5	67.5	"	"	81.2	"	"
	60 ...	"	81.0	"	"	"	82.9	"	"
	70 ...	"	82.2	"	"	"	"	"	"
	80 ...	"	83.0	"	"	"	"	"	"
	90 ...	"	83.0	69.4	"	"	"	"	"
	700 ...	79.4	83.0	69.4	79.4	78.8	82.9	79.4	79.4



Filter No.:	34	35	36	37	38	38A	39	40	40A
Total Transmission:	1.3	0.9	0.2	50.0	38.0	16.5	0.6	38.0	37.5
400 ...	54.9	56.4	18.7	72.4	57.6	33.8	85.2	....	....
10 ...	60.2	57.6	18.7	"	63.1	38.9	78.2	....	....
20 ...	63.0	51.3	15.0	72.4	66.0	43.5	70.5	....	....
30 ...	61.6	39.7	9.5	"	69.0	46.6	63.3	....	....
40 ...	53.4	27.6	4.2	72.4	69.9	49.0	53.6	....	....
50 ...	39.7	16.0	1.3	"	70.8	49.6	41.9	....	....
60 ...	28.2	6.3	.35	71.9	71.9	50.1	35.3	5.24	.80
70 ...	15.8	.80	....	70.3	70.8	49.0	17.3	27.6	5.94
80 ...	7.08	....	....	69.9	69.4	46.9	10.2	54.9	18.2
90 ...	1.55	....	....	69.1	67.5	43.5	4.0	66.0	36.4
500 ...	....	....	....	67.0	63.7	39.7	1.33	72.4	49.0
10 ...	....	....	....	66.5	63.1	36.6	.35	72.4	56.3
20 ...	....	....	....	66.0	60.2	31.6	....	71.8	60.2
30 ...	....	....	....	62.8	57.6	27.6	....	66.0	61.5
40 ...	....	....	....	60.1	53.6	23.8	....	60.0	57.6
50 ...	....	....	....	55.1	49.0	19.5	....	50.6	49.0
60 ...	....	....	....	50.1	42.5	15.0	....	36.1	37.9
70 ...	....	....	....	42.6	37.0	11.7	....	22.9	28.7
80 ...	....	....	....	34.7	31.6	8.3	....	11.8	19.5
90 ...	....	....	....	27.6	26.2	5.6	....	5.0	12.3
600 ...	....	....	....	21.4	21.9	3.7	....	1.95	7.08
10 ...	....	....	....	15.5	17.8	2.3	....	.71	3.99
20 ...	....	....	....	12.5	14.1	1.5	....	.28	2.18
30 ...	....	....	....	10.0	11.5	.96	....	.10	.53
40 ...	.57	....	....	8.3	10.0	.62	....	....	.33
50 ...	4.60	2.5	....	8.3	9.1	.52	....	....	.10
60 ...	14.7	14.1	....	10.0	8.8	.42	....	....	....
70 ...	31.6	31.6	1.26	15.2	8.5	.40	....	....	.24
80 ...	49.0	47.9	6.3	21.7	8.3	.39	.50	1.97	3.17
90 ...	66.1	57.6	17.3	29.5	"	.38	4.06	7.95	6.31
700 ...	79.4	63.1	33.0	39.0	8.0	.37	17.8	15.7	10.0

Wave Length

Wave Length	Filter No.: 43	44	44A	45	45A	46	47	47A
Total Transmission:	12.5	15.0	11.0	5.0	2.0	2.1	2.9	0.9
400 ...	74.0	5.0	5.5	....	....	2.1	25.1	12.3
10 ...	72.4	4.6	4.7	....	....	1.97	35.4	19.9
20 ...	70.4	6.2	5.0	....	....	2.5	44.6	28.2
30 ...	67.5	15.8	13.5	2.5	.62	5.7	49.0	32.2
40 ...	64.2	27.3	30.2	18.2	7.1	13.8	49.0	31.6
50 ...	61.4	36.6	42.8	27.6	15.8	25.7	47.8	29.5
60 ...	57.6	42.5	48.6	34.7	20.7	31.0	43.7	26.2
70 ...	55.0	47.6	50.5	39.9	22.9	31.5	37.4	20.8
80 ...	51.2	52.4	49.4	41.5	22.5	28.7	30.3	13.5
90 ...	47.8	55.6	47.9	39.9	18.7	21.9	21.8	7.58
500 ...	45.5	56.4	41.8	34.9	14.4	10.7	12.5	3.30
10 ...	39.9	53.4	35.5	28.3	9.0	4.60	5.42	.80
20 ...	36.1	46.9	29.5	16.9	4.4	1.6	1.30	.10
30 ...	29.5	37.8	22.9	8.0	1.26	.31	.15	....
40 ...	21.9	26.8	16.0	2.2	.12	....	....	....
50 ...	15.0	17.0	10.0	.10	....	....	....	....
60 ...	9.5	9.4	5.0	....	....	....	....	....
70 ...	5.7	3.17	1.67	....	....	....	....	....
80 ...	2.8	.27	.16	....	....	....	....	....
90 ...	1.1	....	....	....	....	....	....	....
600 ...	.35	....	....	....	....	....	....	....
10 ...	.10	....	....	....	....	....	....	....
20 ...	....	....	....	....	....	....	....	....
30 ...	....	....	....	....	....	....	....	....
40 ...	....	....	....	....	....	....	....	....
50 ...	....	....	....	....	....	....	....	....
60 ...	....	....	....	....	....	....	....	....
70 ...	....	....	....	....	....	....	....	....
80 ...	....	....	....	....	....	....	....	....
90 ...	2.0	....	.12	....	....	....	....	....
700 ...	10.0	....	1.0	....	....	....	....	....

Wave Length	Filter No.: 48	48A	49	49A	49B	49C	50	51	52
Total Transmission:	1.0	0.6	0.5	0.7	0.3	0.1	0.2	70.0	21.0
400 ...	2.68	8.2	5.76	12.0	2.29	.65	.46	55.1	1.83
10 ...	2.4	10.9	7.24	13.5	2.80	.79	.37	52.5	1.4
20 ...	3.4	15.5	9.75	16.5	3.99	1.42	.77	45.8	.80
30 ...	7.9	21.3	12.8	27.6	6.31	3.17	4.0	39.7	.48
40 ...	19.1	25.5	20.0	36.2	10.0	6.03	8.7	36.1	.37
50 ...	31.6	27.1	26.2	41.6	13.8	7.58	13.8	37.0	.44
60 ...	36.9	25.0	26.2	41.6	15.1	8.28	14.4	39.6	.80
70 ...	34.9	19.6	20.0	36.2	10.0	6.54	6.9	44.6	2.45
80 ...	26.2	12.0	10.4	27.6	3.99	1.97	1.97	49.4	5.24
90 ...	17.3	5.6	3.17	15.8	1.00	.21	.12	52.4	9.6
500 ...	9.1	2.23	.49	7.75	.10	....	....	60.1	14.4
10 ...	2.5	.31	....	2.02	....	....	....	66.1	19.8
20 ...	....	....	....	.18	....	....	....	68.9	25.1
30 ...	....	....	....	....	....	....	....	69.2	28.7
40 ...	....	....	....	....	....	....	....	75.6	31.6
50 ...	....	....	....	....	....	....	....	74.5	33.0
60 ...	....	....	....	....	....	....	....	73.9	31.6
70 ...	....	....	....	....	....	....	....	72.5	25.1
80 ...	....	....	....	....	....	....	....	71.9	18.2
90 ...	....	....	....	....	....	....	....	64.5	11.5
600 ...	....	....	....	....	....	....	....	60.6	6.6
10 ...	....	....	....	....	....	....	....	56.0	3.6
20 ...	....	....	....	....	....	....	....	52.4	2.2
30 ...	....	....	....	....	....	....	....	49.0	1.26
40 ...	....	....	....	....	....	....	....	45.8	.83
50 ...	....	....	....	....	....	....	....	43.2	.59
60 ...	....	....	....	....	....	....	....	40.2	.44
70 ...	....	....	....	....	....	....	....	39.0	.33
80 ...	....	....	....	....	....	....	....	37.8	.22
90 ...	....	....	....	.10	....	....	....	37.2	....
700 ...	....	....	....	.31	....	....	....	36.9	....

Filter No.:		53	54	55	56	57	57A	58	58A
Total Transmission:		9.5	4.1	31.0	48.0	35.0	34.0	23.0	16.0
Wave Length	400 ...	....	....	....	....	....	....	....	....
	10 ...	....	....	....	....	....	....	....	....
	20 ...	....	....	....	....	....	....	....	....
	30 ...	....	....	....	....	....	....	....	....
	40 ...	....	....	....	....	....	....	....	....
	50 ...	....	....	....	....	....	.21	....	....
	60 ...	....	....	....	1.0	.51	2.5	....	....
	70 ...	....	....	2.5	6.3	4.0	9.1	....	....
	80 ...	.93	....	10.7	21.7	15.8	22.9	1.97	....
	90 ...	2.7	....	29.5	37.3	39.0	43.8	11.46	5.0
	500 ...	5.2	....	52.4	52.4	53.9	57.6	30.23	18.2
	10 ...	8.1	.10	67.5	64.2	59.8	66.0	50.1	34.7
	20 ...	12.0	.31	72.4	68.9	59.3	69.4	60.2	39.4
	30 ...	16.5	.64	64.6	66.0	58.8	66.0	54.7	37.3
	40 ...	18.9	.89	54.7	63.1	55.6	56.4	39.0	31.6
	50 ...	17.8	.93	44.5	57.6	50.1	44.5	30.2	23.4
	60 ...	14.4	.62	33.0	51.3	41.8	34.7	25.1	14.9
	70 ...	10.2	.21	21.9	44.5	30.2	24.6	17.0	7.9
	80 ...	6.4	....	12.0	37.3	19.6	15.8	10.0	3.3
	90 ...	3.17	....	5.0	31.6	11.67	10.1	5.5	1.0
	600 ...	1.30	....	1.83	25.1	6.3	6.3	2.8	.16
	10 ...	.44	....	.62	17.7	3.17	3.78	1.3	....
	20 ...	.15	....	.18	11.5	1.38	2.0	.57	....
	30 ...	...	....	....	5.9	.40	1.0	.21	....
	40 ...	....	....	....	1.97	....	.31	....	....
	50 ...	....	....	....	.90	....	....	....	....
	60 ...	....	....	....	1.21	....	.20	....	....
	70 ...	....	....	.10	4.6	1.0	1.14	....	....
	80 ...	....	....	1.97	13.8	5.0	2.86	....	....
	90 ...	....	....	9.11	28.7	14.5	5.0	.10	.37
	700 ...	....	....	26.2	50.1	31.0	7.49	1.97	.73

Filter No.:	59	59A	60	61	62	63	64	65
Total Transmission:	36.0	44.0	25.0	18.0	4.0	6.0	25.	8.3
400	....	.37	....	....	....	.22	11.7	2.98
10	....	.46	....	....	....	....	13.2	2.2
20	.11	.62	....	....	....	....	55.1	1.83
30	.18	1.0	....	....	....	....	17.0	2.13
40	.37	1.69	....	....	....	....	19.9	3.57
50	1.0	3.3	.26	....	....	....	25.1	5.9
60	3.6	6.9	2.5	....	....	....	31.6	9.3
70	10.9	15.2	8.7	....	....	1.97	41.6	14.7
80	24.6	28.0	19.1	....	....	5.9	50.1	22.3
90	41.8	46.9	34.7	2.5	....	10.9	57.6	28.7
500	60.2	63.1	49.0	17.8	....	15.2	60.2	33.0
10	68.9	69.9	57.6	33.8	.26	18.2	58.9	33.0
20	68.9	74.5	58.8	47.9	8.0	17.3	52.4	25.9
30	63.1	72.4	55.2	52.4	14.7	13.0	44.5	18.2
40	57.6	66.0	49.0	47.9	10.9	7.2	36.2	11.5
50	50.1	60.6	38.1	38.1	5.0	3.0	27.6	6.9
60	39.4	52.4	25.1	25.7	1.46	.77	20.4	3.6
70	29.5	43.8	14.1	14.4	.16	....	13.2	1.42
80	20.4	36.4	6.8	6.3	....	....	8.17	.44
90	13.5	29.0	1.78	2.18	....	....	4.44	....
600	8.3	21.4	.77	.51	....	....	2.40	....
10	5.0	14.9	.19	....	....	....	1.05	....
20	2.3	9.6	....	....	....	....	.44	....
30	.71	5.0	....	....	....	....	.15	....
40	.10	1.42	....	....	....	....	....	....
50	....	.90	....	....	....	....	....	....
60	....	1.26	....	....	....	....	....	....
70	1.3	3.99	....	....	....	....	....	....
80	5.4	10.0	....	....	....	....	....	....
90	12.0	20.2	.89	....	....	....	....	....
700	19.8	30.2	2.5	....	....	....	....	....

Wave Length

Filter No.:		65A	66	67	68	69	70	71A	72
Total Transmission:		8.2	58.0	15.0	10.6	26.0	0.6	1.0	1.0
Wave Length	400 ...	.36	10.4	2.86	6.6	1.34	....	....	....
	10 ...	.31	10.8	3.9	4.9	1.34	....	....	....
	20 ...	.39	11.9	5.0	4.5	1.60	....	....	....
	30 ...	1.42	14.1	8.7	6.1	5.24	....	....	....
	40 ...	5.0	18.2	10.0	10.7	11.5	....	....	....
	50 ...	11.7	25.1	15.5	19.6	17.4	....	....	....
	60 ...	20.4	36.4	22.3	28.3	25.7	....	....	....
	70 ...	29.5	47.8	28.7	34.7	35.4	....	....	....
	80 ...	37.9	58.8	35.5	38.0	45.7	....	....	....
	90 ...	45.5	67.9	41.8	38.0	56.0	....	....	...
	500 ...	45.5	76.1	44.6	35.3	62.9	....	....	....
	10 ...	39.8	81.0	44.5	30.2	66.1	....	....	....
	20 ...	30.7	84.5	41.5	24.0	62.9	....	....	....
	30 ...	20.8	84.5	36.4	17.0	53.8	....	....	....
	40 ...	11.7	82.8	28.8	10.0	40.7	....	....	....
	50 ...	4.8	77.7	20.8	4.4	26.3	....	....	....
	60 ...	1.2	70.6	13.4	1.4	15.4	....	....	....
	70 ...	....	63.1	8.0	.27	7.58	....	....	....
	80 ...	....	56.0	4.1	....	3.11	....	....	....
	90 ...	....	46.6	1.88	....	1.10	....	....	1.14
	600 ...	....	37.8	.70	....	.33	....	....	3.78
	10 ...	....	28.8	.25	....	.10	....	1.26	4.4
	20 ...	....	19.1	....	....	....	....	7.1	2.86
	30 ...	....	9.0	....	....	....	....	9.8	1.51
	40 ...	....	4.44	....	....	....	....	10.0	.78
	50 ...	....	2.68	....	....	....	1.0	9.2	.37
	60 ...	....	3.17	....	....	....	10.0	8.0	.37
	70 ...	....	9.0	....	....	.38	25.1	7.1	.49
	80 ...	....	26.8	....	1.26	2.23	39.8	6.6	1.24
	90 ...	1.0	44.5	....	8.0	4.55	57.6	6.7	3.78
	700 ...	2.1	57.6	....	25.0	6.03	74.5	8.0	11.5

Filter No.:	73	74	75	76	77	77A	78	78AA
Total Transmission:	3.3	3.3	1.5	0.1	40.0	....	14.0	22.5
400 ...	....	....	....	2.29	....	....	43.5	51.3
10 ...	....	....	....	2.29	....	....	47.9	53.6
20 ...	....	....	....	2.8	....	....	50.1	57.6
30 ...	....	....	....	6.3	....	....	49.8	57.6
40 ...	....	....	....	9.5	....	....	49.0	57.6
50 ...	....	....	....	8.0	....	....	45.9	54.6
60 ...	....	....	.80	4.4	....	....	42.7	51.3
70 ...	....	....	6.3	1.6	....	....	38.1	45.6
80 ...	....	....	17.3	....	....	....	33.0	40.7
90 ...	....	....	19.1	....	....	....	31.1	35.6
500 ...	....	....	14.1	....	....	....	25.1	31.5
10 ...	....	1.0	5.0	....	1.93	.17	21.4	27.6
20 ...	....	8.0	1.3	....	12.5	4.36	17.8	24.0
30 ...	....	15.1	.31	....	12.8	3.99	15.1	21.4
40 ...	....	10.0	....	....	55.8	46.9	12.5	19.0
50 ...	....	4.0	....	....	76.1	74.0	10.6	17.0
60 ...	2.5	1.14	....	....	72.4	57.6	9.1	15.9
70 ...	8.0	.12	....	....	10.7	.64	7.6	14.8
80 ...	5.7	....	....	....	.42	....	7.0	13.7
90 ...	2.68	....	....	....	.15	....	6.6	12.7
600 ...	1.1	....	....	....	14.4	1.26	6.3	12.3
10 ...	.39	....	....	....	37.9	37.0	5.6	11.7
20 ...	.15	....	....	....	66.1	63.2	4.9	11.0
30 ...	....	....	....	....	76.1	69.3	4.4	10.0
40 ...	....	....	....	....	79.4	74.0	4.0	9.1
50 ...	....	....	....	....	81.4	76.1	3.8	8.0
60 ...	....	....	....	....	83.0	77.7	3.6	7.43
70 ...	....	....	....	....	83.0	79.4	3.6	7.28
80 ...	.15	....	....	....	83.0	79.4	3.7	7.43
90 ...	2.18	....	.10	.26	83.0	79.4	4.0	7.69
700 ...	6.3	....	.24	.46	83.0	79.4	4.5	8.59

Filter No.:	78A	78B	78C	79	86	86A	86B	86C	88
Total Transmission:	39.0	54.0	74.0	9.0	60.0	75.0	84.0	85.0	....
400 ...	55.0	60.6	66.0	23.4	.48	10.0	34.7	52.4	....
10 ...	57.5	63.0	67.5	26.3	1.6	17.3	41.4	58.9	....
20 ...	58.4	64.2	68.9	28.0	3.6	25.7	47.6	63.3	....
30 ...	58.4	64.6	68.9	29.5	6.3	33.0	51.3	67.5	....
40 ...	58.4	64.2	69.4	29.9	9.3	37.3	55.0	71.9	....
50 ...	57.5	63.0	70.4	29.9	12.5	39.9	58.9	75.5	....
60 ...	57.2	63.1	69.9	29.7	15.8	43.8	61.9	77.7	....
70 ...	54.4	62.9	69.4	28.8	19.1	46.8	64.6	79.1	....
80 ...	52.8	60.1	69.4	26.8	21.6	49.0	66.5	80.5	....
90 ...	50.0	57.6	69.4	25.2	25.1	50.1	69.0	81.5	....
500 ...	47.9	56.4	67.9	22.3	27.1	52.4	70.0	83.0	....
10 ...	45.9	55.0	67.4	20.0	31.5	56.0	72.0	83.3	....
20 ...	43.8	52.8	64.6	17.8	33.0	57.6	72.9	"	....
30 ...	40.4	51.3	64.0	16.0	37.3	61.5	73.9	"	....
40 ...	39.1	49.8	63.1	14.4	42.5	63.1	74.5	"	....
50 ...	37.0	49.0	61.5	12.8	47.8	66.1	75.8	"	....
60 ...	35.5	47.9	59 5	11.5	55.2	68.9	76.1	"	....
70 ...	33.1	45.9	57 6	10.0	60.2	72.4	76.1	"	....
80 ...	31.6	45.5	56 4	8.7	66.0	75.6	76.1	"	....
90 ...	30.2	44.6	55.0	7.2	68.9	77.7	77.1	"	....
600 ...	28.8	43.8	54 8	6.4	72.4	79.4	77.1	83.3	....
10 ...	27.6	42.7	53.6	5.1	76.1	81.0	"	"	....
20 ...	26.3	41.8	52.8	4.1	78.3	83.4	"	"	....
30 ...	25.0	41.5	52.4	3.6	79.3	"	"	"	....
40 ...	24.6	40.7	51.6	3.0	79.4	"	77.8	"	....
50 ...	23.4	39.8	51.6	2.7	"	"	"	"	....
60 ...	22.9	39.8	51.7	2.7	"	"	"	"	....
70 ...	22.1	39.8	53.8	2.9	"	"	"	"	....
80 ...	21.9	39.6	54.8	2.8	"	"	"	"	....
90 ...	23.0	39.6	56.1	3.0	"	"	"	"	1.0
700 ...	25.8	39.6	59.7	3.2	79.4	83.4	78.8	83.3	5.0

Wave Length

Filter No.:		89	89A	90	91	96	97	97A	97B
Total Transmission:		0.5	....	15.0	....	....	0.25	0.4	1.0
Wave Length									
400	...	....	....	....	....	6.72	....	....	....
10	...	....	....	....	....	7.58	....	....	....
20	...	....	....	....	....	7.96	....	....	....
30	...	....	....	....	....	8.12	....	....	....
40	...	....	....	....	....	8.12	....	....	....
50	...	....	....	....	....	7.96	....	....	....
60	...	....	....	....	....	7.85	....	....	....
70	...	....	....	....	....	7.58	.40	.16	1.59
80	...	....	....	....	....	7.43	1.0	1.80	3.5
90	...	....	....	....	....	7.23	1 26	2.57	4.1
500	...	....	....	....	....	7.23	1.0	1.59	3.5
10	...	....	....	....	....	7.23	.49	.68	2.5
20	...	....	....	....	....	7.23	.16	.40	1.69
30	...	....	....	....	....	7.58	....	.22	1.0
40	...	....	....	....	....	7.85	....	....	.72
50	...	....	....	.10	....	7.96	....	....	.77
60	...	....	....	12.5	....	8.12	....	.12	.67
70	...	....	....	36.1	....	8.12	.115	.12	.49
80	...	....	....	33.0	....	8.12	....	....	.31
90	...	....	....	23.4	....	7.96	....	....	.20
600	...	....	....	15.8	....	7.58	....	....	....
10	...	....	....	10.7	....	7.23	....	....	....
20	...	....	....	6.7	....	7.08	....	....	....
30	...	....	....	4.0	....	6.93	....	....	....
40	...	....	....	1.0	....	6.93	....	....	....
50	...	.26	....	.44	....	6.93	....	....	.11
60	...	5.0	....	.64	....	6.93	....	.44	.59
70	...	16.6	....	3.17	.39	7.23	1.6	1.83	1.97
80	...	33.0	.62	11.2	3.17	7.3	5.0	5.0	5.6
90	...	50.1	7.1	31.6	10.0	7.58	20.2	11.5	13.5
700	...	64.6	20.2	57.6	14.4	7.85	41.5	20.2	26.9

FILTER FACTORS FOR USE WITH EASTMAN AND WRATTEN PANCHROMATIC FILMS AND PLATES.

Filter	Number	Daylight	Open Arc	Enclosed Arc
Aero No. 1	3	1.5	1.2	1.2
Kodak Color Filter	4	2.7	2.5	2.5
K1	6	1.5	1.2	1.2
K 1½	7	2.0	1.15	1.15
K2	8	3.0	3.0	3.0
K3	9	4.5	4.0	4.0
Minus Blue	12	5	5	5
G	15	5	5	5
Monobromfluoresceine	21	8	7	7
E	22	10	8	8
E Red	23	11	8	8
A	25	12	9	9
Stage Red	27A	14	9	9
F	29	25	12	12
Minus Green 3	32	3	2	2
Minus Red 5	44A	4	4	4
Minus Red 4	44	4	4	4
H	45	5	5	5
Eta Blue	46	5	5	5
Stage Blue	47A	5	5	5
C	49	8	8	8
C4 Dark	49B	9	9	9
L	50	9	8	7
B2 Light	57	10	8	8
B	58	10	12	10
P	60	10	8	8
N	61	16	16	12
R	70	50	40	30

PRICE LIST OF FILTERS

Filters as Gelatin Film

Note with regard to the area of gelatin filters. The area of a filter is found by multiplying together the length of two adjacent sides. Thus a piece of film two inches square contains four square inches. Circles are taken as being of the area of the square from which they are cut. A three-inch diameter circle is thus charged as nine square inches.

Filters (Nos. 18A, 39, 76, 77, 77A, 78, 78AA, 78A, 78B, 78C, 79, 86, 86A, 86B, 86C, 91) cannot be supplied as film.

Our price for film is:

Tricolor filters, $.25 per square inch, per set. Minimum $.50.

All other single filters, except 96, $.10 per square inch. Minimum $.20.

No. 96, $.20 per square inch. Minimum $.50.

Filters Cemented in Glass

We cement filters in three qualities of glass according to the purpose for which they are required:

A. Optical Flats hand surfaced of the highest quality.

B. Optical glass of good quality working satisfactorily on ordinary photographic lenses.

C. White optical glass of imperfect figure, suitable for visual work or such purposes as spectroscopy or photomicrography where the filter is placed in the path of a dispersed beam.

Unless specially indicated filters are supplied cemented in "B" glass.

Prices of Gelatin Film Filters

Size	Single Filters	Size	Single Filters
1¼″ square or less	$ .20	2½″ square	$ .65
1½″ "	.25	3″ "	.90
1¾″ "	.30	3½″ "	1.25
2″ "	.40	4″ "	1.60
2⅛″ "	.45	5″ "	1.70

WRATTEN FILTERS

Cemented Filters, "B" Glass

Size	Unmounted Circles	Unmounted Squares	Mounted in Metal cells
3/4	$1.15	$1.15	$2.40
1	1.30	1.30	2.55
1 1/16	....	....	2.85
1 1/8	....	....	2.85
1 1/4	1.45	1.45	2.85
1 5/16	....	....	3.15
1 3/8	1.65	....	3.15
1 1/2	1.65	1.65	3.15
1 9/16	....	....	3.30
1 5/8	1.75	....	3.30
1 11/16	....	....	3.45
1 3/4	1.90	1.90	3.45
1 7/8	2.10	....	4.20
1 15/16	....	....	4.20
2	2.10	2.10	4.20
2 1/8	2.25	2.25	4.50
2 1/4	....	2.85	6.00
2 5/16	....	....	6.00
2 3/8	....	2.85	6.00
2 1/2	2.85	2.85	6.00
2 5/8	....	....	7.50
2 3/4	....	3.75	7.50
2 7/8	3.75	....	7.50
3	3.75	3.75	7.50
3 1/4	....	4.75	....
3 1/2	5.65	5.65	....
4	6.75	6.75	13.50
4 1/2	....	9.40	....
5	....	9.40	....

All filters cemented in the "B" quality glass are charged for at the above prices, except Nos. 76, 77, 77A, 79 and 91.

We carry a full assortment of all ordinary sizes of filters mounted in slip-on cells. Orders for these should state the exact outside diameter of the lens hood. For this form of fitting it is necessary to send us the outside measurement of the lens-barrel, and this measurement must be made very exactly. If a pair of sliding calipers cannot be obtained, a strip of hard writing paper should be wrapped around the lens so that the ends overlap. At this point the paper should be cut through while in position with a sharp knife.

Prices of Filters Cemented in Flats, "A" Glass

Size	Supplied on order only Unmounted Squares or Circles	Mounted in Slip-on Cells
1″	$ 6.50	
1¼″	9.00	
1½″	11.25	
2″	12.75	
2½″	18.00	
2¾″	21.00	If required in Slip-on or Screw Cells, Prices on application
3″	25.50	
3¼″	28.00	
3½″	31.50	
4″	39.00	
4½″	45.00	
5″	60.00	

When ordering flats in screw cells or other fitting, the following particulars should be given:

1. Name of lens.
2. Focal length.
3. Maximum working aperture.
4. Length and diameter of lens barrel, over all.
5. Size of plate used.
6. If used for other than ordinary infinity work, give average extension of camera.
7. If screw cells are required, lens combination must be sent.
8. If slip-on cells are wanted, it is better to send the hood to insure a good fit for these heavy filters.

WRATTEN TRICOLOR FILTERS

Gelatin Film Standard Tricolor Filters

These filters have the same properties of absorption as cemented filters, but they are only recommended for experimental purposes, as handling and exposure necessarily soon cause deterioration.

The price of standard Tricolor Film is $.25 per square inch per set of three; minimum order, $.50.

Size	Set of Tricolor	Size	Set of Tricolor
1¼″ square or less	$ .50	2″ square	$1.00
1½″ "	.60	2½″ "	1.60
1¾″ "	.80	3″ "	2.25

Cemented Tricolor Filters

These filters are the standard all over the world for making negatives for all tricolor processes. Their transmissions are

even, and end as abruptly as possible, the blue-violet and green overlapping from wave length 480 to 500, and the red and green from 580 to 600. They are optically tested by means of specially designed instruments of great precision and are confidently offered as the most scientifically constructed filters available.

The cemented Tricolor Filters ("B" glass) are mounted in selected parallel plate glass, and give satisfactory optical definition and register with short focus lenses. If, however, the most accurate definition and register are required, filters cemented in Flats ("A" glass) should be used, especially with long-focus lenses, such as those used in process work.

PRICE LIST OF FILTERS—Continued

Cemented in "B" Glass—*i. e.*, White Optical Glass of good quality.

Size	Set of 3	Set of 4 Tri. and K3	Set of 5, Tri. K3 and Dummy
2″ square	$ 7.55*	$ 9.65*	$11.75
2½″ "	9.80	12.65	15.50
3″ "	12.50*	16.25*	20.00
3¼″ "	15.50	20.25	25.00
3½″ "	18.20	23.85	29.50
4″ "	21.50*	28.25*	35.00
5″ "	29.45	38.85	48.25

Circles made to order only. Prices same as for squares. Cases for these sets $4.00 extra.

*Indicates an article carried in stock.

Tricolor Filters Cemented in Optical Flats of the Highest Quality, "A" Glass

For the most accurate definition, and wherever screens are to be used with long-focus lenses, it is necessary to use filters cemented in glass which have been surfaced with the same accuracy as lenses. Such filters are prepared as filters cemented in flats.

Sets of Flats "A" Glass, Circle or Square

Size	Tri. Set or Set of K1, 2 and 3	Set of 4 Tri and K3	Set of 5, Tri. K3 and dummy
2″	$ 38.25	$ 51.00	.....
2½″	54.00	72.00	.....
2¾″	63.00	84.00	.....
3″	76.50	102.00*	$127.50*
3¼″	84.00	112.00	.....
3½″	94.50	126.00*	157.50*
4″	117.00	156.00*	195.00*
4½″	135.00	180.00	.....
5″	180.00	240.00	.....

We only stock *square flat filter sets* in sizes larger than 2¾″.

*Indicates an article carried in stock.

Wratten Experimental Film Filter Book

Contains 30 Tricolor Gelatin Film Filters, 2 x 3″ ..... $ 9.00
60 Gelatin Filters, 2 x 3″ 18.00

SET OF COMMERCIAL FILTERS

Commercial Set of 3 Filters K3, G & A

Cemented in "B" glass, 3″ square in case ..... $16.50 the set
Single Filters ..... 3.75 each

Commercial Filters Set of 8 Filters

Gelatin Film 2″ square ..... $ 2.75
Gelatin Film 3″ square 6.25
Cemented in "B" Glass 4″ square in case 59.00

Technical Set of 8 Filters

The most generally useful filters for commercial and general photography are the following: A, B, C (standard tricolor) K1, K2, K3, G (Orange), and F (deep Red). The factors for all these are given on the instructions in every box of Wratten Panchromatic Plates. Cemented in "B" glass, 3″, $35.00 the set in case; single filters, $3.75 each.

SETS OF SCIENTIFIC AND EXPERIMENTAL FILTERS

Special Laboratory Set of Filters

Filters 2 inches square cemented in "B" glass. Containing all the filters required for Orthochromatic work, Contrast, Tricolor, Two-color, Artificial light, Projection, Spectroscopy, Photomicrography, and general scientific purposes. These filters are marked with an asterisk in the list. Fifty filters in mahogany case. Price $120.00.

Smaller Set of 24 Filters in Case

Contains the following filters, for any of which others (except special filters) can be substituted if required

Name	No.	Name	No.
Aesculine	2	C	49
K2	8	L	50
K3	9	B2	58
Minus Blue	12	P	60
G	15	N	61
E2	22	α	70
A	25	β	71A
F3	29	γ	72
Minus Green 3	32	δ	73
D	35	ϵ	74
Minus Red 5	44A	η	75
H	45	θ	76

This set includes the Tricolor, M, Complementary, and Monochromatic sets. Filters 2 inches square, cemented in "B" glass. Price $55.00.

SCIENTIFIC AND EXPERIMENTAL FILTERS—Cont.

"M" Filters (for microscopy)

(See booklet on "Photomicrography.")

Name	No.	Name	No.
A	25	E	22
B	58	F	29
C	49	G	15
D	35	H	45
		K1	6

M Filters. In sets of 9

2 inches square, Gelatin Film	$ 2.50
2 inches, cemented in "C" glass in leather case	16.00
3 inches, cemented in "C" glass in leather case	30.00
4 inches, cemented in "C" glass in leather case	42.00

Wratten Visual M Filters

Set of nine visual filters mounted in thin glass 33 mm. disks, $12.00.

Wratten-Rheinberg Differential Color Filters

Set of twelve filters mounted in thin glass, 33 mm. disks, $16.00.

Spectroscopic Filters

Name	No.	
Aesculine	2	Removes ultra-violet. Cuts at 400.
K2	8	Removes ultra-violet and violet. Cuts at 470.
G	15	Removes blue and violet. Cuts at 510.
A	25	Transmits only red and orange from 580. up.
F	29	Transmits only red from 610 up.
R	70	Transmits only red from 650 up.
Methyl Violet B. B. R.	36	With G. Transmits only extreme red from 680 up.
Quinoline Yellow	17	Absorbs visual violet for photography of ultra-violet.

Set of 8 Filters

Cemented in "C" glass, 2 inches square in case	$15.00 per set
In gelatin film, 2 inches square	2.75 per set
1 inch square	.90 per set

SCIENTIFIC AND EXPERIMENTAL FILTERS—Cont.

Analysis Filters for Screen Plates	F	29	Supplied at standard prices for filters in "B" glass
	N	61	
	L	50	
Complementary Filters	Minus Red 5	44A	
	Minus Green 3	32	
	Minus Blue	12	
Viewing Filters for Anaglyphs	Stereo Red	26	
	Stereo Green	55	

Monochromatic Filters

Name	Number	Name	Number
α	70	ϵ	74
β	71A	η	75
γ	72	θ	76
δ	73		

Sets of 7 Filters

Cemented in "B" glass, up to and including 2 in., $22.00 per set. Single filters, Nos. 70, 71A, 72, 73, 74 and 75, $2.10 each; No. 76, $4.00 each.

Mercury Vapor Lamp Monochromats

Yellow	22	Transmitting yellow lines only.
Green	62	Transmitting green line.
Blue	50	Transmitting blue and violet lines.
Special green line	77	Transmitting green line and trace of yellow.
	77A	Transmitting green line only.

Set of 3, yellow, green, and violet, cemented in "C" glass, 2 inches square, $4.00; single filters, $1.35 each, except Nos. 77 and 77A.

No. 77 transmitting ½ per cent. of the yellow lines, 72 per cent. of 546 m μ, 2 inches square, $8.00; No. 77A transmitting none of the yellow lines, 50 per cent. of 546 m μ, 2 inches square, $15.00.

Monochromatic Viewing Filter

2 inches square, $2.10 each.

Infra-Red Filters

No. 91 —Lightest (compound).
No. 88 —Standard for Infra-red Photography.
No. 88A—Standard for Infra-red Photography.
No. 87 —Extra Dark. Visually Opaque.
No. 89 —Light for Invisible Daylight Signaling.
No. 89A—Dark for Invisible Daylight Signaling.
Supplied at Standard Prices, with the exception of No. 91.

SCIENTIFIC AND EXPERIMENTAL FILTERS—Cont.

Ultra-Violet Filter, No. 18A

1″ x 1″ square	$ 3.50
2″ x 2″ "	11.00
4″ x 4″ "	40.00
4″ x 2″ rectangular	20.00

Photometric Filters

Photometric Filters for obtaining color matches with lamps burning at different efficiencies.

Dummy Filter	0	for setting zero.
Daylight to Tungsten	86	
Photometric Yellowish	86A	
" "	86B	
" "	86C	
Tungsten to Daylight	78	
Photometric Bluish	78A	
" "	78B	
" "	78C	

These filters are supplied only in sets cemented in "B" glass.
Sets of 9, 2¼ inches square $29.00

NEUTRAL TINT OPTICAL FILTERS AND WEDGES

Neutral tint filters and wedges made by the Eastman Kodak Company are prepared by cementing, between optical glasses, gelatin containing a mixture of dyes so balanced as to obtain substantial spectral neutrality. They are made of certain definite transmissions, which are measured with precision upon approved types of photometers.

Neutral Tint Optical Filters

In Three Series

Decimal

Transmissions	1/10	1/100	1/1000	1/10000
Densities	1	2	3	4

Sizes carried in stock 1 cm., 2 cm. and 5 cm. square.

NEUTRAL TINT FILTERS AND WEDGES—Cont.

Logarithmic

Transmissions..	1/2	1/4	1/8	1/16	1/32
Densities.....	.3	.6	.9	1.2	1.5

Sizes carried in stock 2½ cm. and 5 cm. square.

Percentage

Transmission....	5%	10%	25%	50%	75%

Sizes carried in stock 2½ cm. and 5 cm square

Prices: All Types Cemented in "B" Glass:

1 cm. square	$1.50
2½ cm. square	2.50
5 cm. square	3.50

Other sizes or transmissions made to order, prices on request.

Neutral Tint Wedges

These wedges are carried in stock in the following ranges:

Transmission Range:	1—1/2	1—1/10	1—1/100	1—1/1000	1—1/10000
Density Range:	0—.30	0—1.0	0—2.0	0—3.0	0—4.0

All wedges are larger than the size given, which is that of the tinted area. 2.54 cm. of clear glass is left at the thick end of all wedges, 2.00 cm. clear glass at the thin end of large wedges, and 1 cm. at the thin end of small wedges.

Compensators and balancing wedges, if required, must be ordered at the same time as the wedge, and one of these is necessary if a calibration of the wedge is required.

Prices

Size of Tinted Area	Plain Wedge	Wedge with Compensator or Balancing Wedge	Calibrated Wedge with Compensator or Balancing Wedge
10 x 1½ cm.....	$6.00	$9.00	$11.50
15 x 2 cm.....	9.00	13.50	16.00
20 x 3 cm.....	12.00	18.00	20.50

Wedges of special transmission or size can be made to order. Prices on request.

Eastman Filter Test Chart

Each..... $ .75

Eastman Adjustable Filter Holder

For Wratten Filter	2 in. sq., for lens mounts 1⅛ to $1\frac{9}{16}$ in.....	$1.25
" " "	3 in. sq., for lens mounts $1\frac{11}{16}$ to 2⅜ in.....	1.50
" " "	4 in. sq., for lens mounts of 2⅜ to 3⅞ in.....	2.50

BOOKS AND BOOKLETS

The following books are published by us and will be of interest:

The Photography of Colored Objects. A book which makes plain the theory underlying the photography of colored objects and the application of that theory to those branches of practice which are of most immediate importance. Price, $.50, postpaid.

Color Films, Plates and Filters for Commercial Photography. A booklet which makes clear the principles involved in the photography of colored objects and the use of panchromatic films, plates and filters. Free on application.

Photomicrography. A booklet dealing with the photographic problems of photomicrography, with a chapter on color photomicrography and the use of stains and filters. Price, $.15, postpaid.

Fundamentals of Photography, by Dr. C. E. K. Mees, written with the object of providing an elementary account of the theoretical foundations of photography in plain and simple language. Fully illustrated and bound in stiff covers. Price, $1.00, postpaid.

All Prices Subject to Change Without Notice.

EASTMAN KODAK COMPANY, ROCHESTER, N. Y.

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